REPORT

OF THE

Tarai and Bhabar Development Committee

Appointed by the United Provinces Government for the investigation of Land Development and Colonization Schemes for Ex-servicemen

March, 1947

ALLAHABAD:
SUPERINTENDENT, PRINTING AND STATIONERY, UNITED PROVINCES, INDIA
1947

GOVERNMENT OF THE UNITED PROVINCES

No. 43-C/XII-C—26-46

RURAL DEVELOPMENT (COLONISATION) DEPARTMENT.

Dated Lucknow, August 8, 1947

RESOLUTION

HEAD—

Report of the Tarai and Bhabar Development Committee

OBSERVATIONS :—The Government appointed in October, 46, a Committee of experts and departmental heads to instigate the problems connected with the development d colonization of certain undeveloped areas in the Tarai d Bhabar and similar adjacent tracts of the province for e purpose of preparing a blue print of all-round development of these areas. The details of the Committee's terms reference are given in paragraph 8 Chapter 1, of the Report

The Report of the Committee has received the anxious d careful consideration of the Government. Government ognize that the problem of developing these areas is an remely difficult one because of the unhealthiness of the [illegible], depredation of wild animals, enervating climate, lack [illegible]munications and unscientific alignment of canals which [illegible] to water-logging. At the same time Government isider that it would not be proper in the public interest to ve this large tract undeveloped at a time when every effort [illegible] be made to augment the food resources of the country. y have come to the conclusion in agreement with the mmittee, that the various obstacles can, with skill and [illegible]c, be surmounted. They have therefore decided to the recommendations of the Committee in general ject to the modification that, in the first instance, only Tarai area should be tackled and brought under resettlet of operations after necessary scrutiny of costs and estimates the departments concerned. Schemes relating to areas r than Tarai should be postponed for the present.

. Government have also approved the following ific recommendations of the Committee :

(*a*) Establishment of a separate Board of Development r the Tarai area. The Board should, however, e a compact and small one consisting of the officials oncerned and other experts.

(*b*) The appointment of the Director of Colonizat with the necessary field and headquarters staff.

(*c*) The creation of a Planning and Construction D sion of the Public Works Department for the Tarai a under an Executive Engineer.

(*d*) Appointment of three departmental experts deal with problems relating to (*a*) Malaria, (*b*) Agric ture and (*c*) Animal Husbandry who will be direc responsible to the Director of Colonization.

3. The Government wish to convey their grateful tha to the Members and the Secretary of the Tarai and Bha Committee for their arduous labour and the sound and c sidered recommendations made by them for the developm of a tract which has remained backward in the past fo variety of reasons.

ORDER—Ordered that the Resolution together with report be published in the *United Provinces Gazette*, general information. The report be also published separat and released for sale.

By order,
A. N. JHA,
Secretary.

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No. 43-C(1)/XII-C—8-46

COPY, together with a copy of the report forwa ed to heads of departments concerned, for information necessary action.

COPY, together with a copy of the report a forwarded to departments of the Secretariat concerned, information and necessary action.

By order,
A. N. JHA,
Secreta

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THE REPORT

REPORT OF THE TARAI AND BHABAR DEVELOPMENT COMMITTEE

CHAPTER I

INTRODUCTORY

Past endeavours and causes of their failures—Because of the excellence of its soil and high fertility, various attempts have been made by various persons and agencies at various times to develop the part of the country, known as the Tarai and Bhabar, lying along the foot of the hills in the Naini Tal District, and to bring it under cultivation and habitation, as a permanent measure of settlement. One of the earliest known efforts was made by the Chand Rajas, Baz Bahadur and other local chieftains but their resources were limited and their knowledge of civil engineering and medical science was elementary, and it appears that their efforts were confined to founding a few townships at strategic places to maintain semblance of authority, excavating a few irrigation channels and constructing ill-regulated earthen bunds across streams that only served to waterlog the country. The aim of the endeavour was to import from outside people who were expected to develop the country with their own resources. Within recent times that good and wise man, Mr. (later Sir Henry) Ramsay who virtually ruled Kumaun for thirty years, made attempts to settle people in the Tarai and Bhabar and achieved a certain measure of success. Small efforts were also made by individuals and a few registered and unregistered companies, but, as might be expected, these ended in failure.

2. **Need for a planned development programme**—For a variety of reasons (amongst which may be counted the Influenza epidemic of 1918, responsible for much depopulation and a series of dacoities over a period of years, on the one hand, and the unhealthiness of the tract and depredation of wild animals on the other) there has been a steady decline in population and cultivation during the last 30 years. The partial success achieved as a result of individual efforts was ephemeral and gave way under heavy odds to deterioration again. This gloomy aspect of past endeavours and failures has, however, not been without its proverbial silver lining. Adverse experience taught the value of concerted efforts and co-ordination of the various developmental activities that may serve to minimise or remove the defects and the shortcomings that in their combined strength worked the ruin of the tract. Consciousness slowly dawned on the architects of development that a planned programme succeeds better than piecemeal and isolated individual or departmental activities, and attempts started to focus the attention on the large and widely divergent lines of work to achieve the common objective of ensuring development of the area on sound lines.

3. **Mr. J. W. Russell's Preliminary Report on development**—The establishment of a Post-War Recconstruction Board for the Province in January, 1943, gave impetus to planning in all directions Mr. J. W. Russell, I.S.E., the then Superintendent of Tarai and Bhabar Government

Estates, prepared a "Preliminary Report on the Scheme of Solidiers Settlement" which forms Appendix I to this report. The *condemnation* of the Scheme by Sir William Stampe, Irrigation Adviser to the Government of India, who considered the problem of Tarai drainage, from an engineering point of view, most difficult and heavy and "insuperable except at prohibitive cost both in initial outlay and subsequent maintenance," sounded the death knell of the scheme which was abandoned and consigned to the archives of the Secretariat.

4. **Renewed efforts for resettlement of ex-servicemen**—As the end of the World-War hove in sight, the question of the returning soldiers began to loom large in the horizon, and it became increasingly clear that, both in the interest of the country and the society, these men must be absorbed in the economic life of the country. It was felt necessary to devise plans for the welfare of ex-servicemen so that, immediately on demobilization, they may be enabled to follow some useful avocation without relapsing into the existing village order which would have difficulty in absorbing them. At the instance of the Government of India, this Government renewed the attempt to develop and colonize the Tarai and Bhabar area, and, in G. O. no. 2885, dated November 11, 1944, ordered a detailed, topographical, contoured survey of about 150 square miles of the Tarai being carried out "in order to ascertain whether by improved drainage a large area in the Tarai can be brought under regular cultivation."

5. **Mr. Radha Kant's schemes for colonisation of ex-servicemen**—Mr. Radha Kant, who has been appointed Member-Secretary of this Committee in addition to his normal duties, was placed on Special Duty at the headquarters of Government to investigate land settlement schemes for ex-servicemen and to make definite recommendations to Government as to action to be taken thereon. Amongst other schemes, he prepared detailed schemes for the colonization of ex-servicemen in (1) Naini Tal Tarai and Bhabar, (2) North Kashipur, Naini Tal District, (3) North Afzalgarh, Bijnor District, and (4) in certain parts of Lakhimpur-Kheri Tehsil. These schemes are printed in Appendix II of this report.

6. **Mr. Hutchinson's note on Development of Collective Farms and Mr. Bowder's note on Tarai Survey**—In addition to the above schemes, Mr. F. H. Hutchinson, C.I.E., I.S.E., Chief Engineer, Eastern Canals, Public Works Department (Irrigation Branch) prepared a note on the "First Stage of Development of Collective Farms in the Tarai and Bhabar Government Estates," which forms Appendix III to this report. Mr. C. M. Bowder, Superintendent, Tarai and Bhabar Government Estates conducted the survey, and his report on the Tarai contoured survey is given in Appendix IV.

7. **Appointment of the present committee**—Government considered that the Tarai and Bhabar areas of Naini Tal District, the northern part of Afzalgarh pargana in Bijnor District and parts of Lakhimpur-Kheri tehsil offered great possibilities for development with a view to provide settlements of ex-servicemen and also as a measure in furtherance of the Grow-More-Food Campaign and deserved a closer and detailed examination. They, therefore, appointed a committee in notification no. 222(c)/XII—C-26-1946, dated October 11, 1946 (reproduced in Appendix V) to investigate the various problems connected with development and

colonization, both from the technical as well as administrative point of view and to prepare a blue-print of schemes for the all-round development of areas examined in Mr. Radha Kant's schemes. The Director of Resettlement, G. H. Q. and Shri Hiralal Arya were added as members to the Committee by notification no. 259-C/XII—C-26-46, dated October 16, 1946, and notification no. 271-C(ii)/XII—C-26-46, dated December 2, 1946, respectively.

7-A. Personnel of the Committee—The following is the personnel of the Committee appointed :

(1) The Hon'ble Pandit Govind Ballabh Pant, Premier, U. P.	*Chairman.*
(2) The Hon'ble Dr. K. N. Katju, Minister of Justice, U. P.	*Vice-Chairman.*
(3) F. H. Hutchinson, Esq., C.I.E., I.S.E., Chief Engineer (E), Canals, U. P.	*Members.*
(4) Dr. A. C. Banerjea, C.I.E., Director of Public Health, U. P. or nominee	
(5) C. Maya Das, Esq., I.A.S., Director of Agriculture, U. P. or nominee	
(6) Director, Animal Husbandry, U. P. or nominee	
(7) V. Viswanathan, Esq., I.C.S., Registrar, Co-operative Societies, U. P. or nominee ...	
(8) W. T. Hall, Esq., C.I.E., I.F.S., Chief Conservator of Forests, U. P.	
(9) J. W. Russell, Esq., I.S.E., Superintending Engineer (Tube-wells)	
(10) Regional Director, Resettlement and Employment, U. P.	
(11) A. P. Watal, Esq., I.S.E., Chief Engineer, Development, U. P.	
(12) W. W. Finlay, Esq., I.C.S., Deputy Commissioner in charge Kumaun Division ...	
(13) C. M. Bowder, Esq., Superintendent, Tarai and Bhabar Government Estates ...	
(14) Lt.-Col. D. Kelly, I.M.S., Superintendent, Central Prison, Bareilly	
(15) B. N. Jha, Esq., C.I.E., I.C.S., Revenue Secretary to Government, U. P. or nominee ...	
(16) L. P. Hancox, Esq., C.I.E., O.B.E., I.C.S., Finance Secretary to Government, U. P. or nominee	
(17) K. B. Bhatia, Esq., O.B.E., I.C.S., Secretary, Agriculture, U. P. or nominee ...	
(18) Lt.-Col. J. Corbett, Naini Tal ...	
(19) Pt. Ganga Datt Mashiyal, Advocate, Naini Tal	
(20) Pt. Laxman Datt Bhatt, Zemindar, Ramnagar, Naini Tal	
(21) Khan Bahadur Sarwat Yar Khan, Darao (Kichha), Naini Tal District	

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(22) Pt. Chintamani Pant, Dopahri (Kichha), Naini Tal District ... ...
(23) Mr. R. N. Agarwal, Kichha Farm, Naini Tal ... ...
(24) Dr. C. D. Pande, D. LITT. (Paris), Private Secretary to Hon'ble Premier ... ...
(25) Shri Shyam Lal Varma, M.L.A., Naini Tal
(26) Mr. Saiyed Ahmad, M.L.A.. Bareilly ...
(27) Rani Sahib Phul Kunwari, M.B.E., M.L.C., Sherkot, Bijnor District ... ...
(28) Mr. Ganga Singh Chooramani, Regional Transport Officer, Kumaun Division, Naini Tal
(29) Director, Resettlement Department, G. H. Q., New Delhi ... ...
(30) Shree Hira Lal Arya, Manora, Naini Tal
(31) Mr. Badri Datt Pande, M.L.C., Naini Tal

Members.

Rai Bahadur Radha Kant, Officer on Special Duty at the Headquarters of Government, was appointed Member-Secretary of the Committee.

At its second sitting on December 17, 1946, the Committee co-opted Mr. F. W. Walker, O.B.E., M.C., I.S.E., Chief Engineer, Public Works Department (Buildings and Roads) as member of the Committee.

Pandit Laxman Datt Bhatt did not find it possible to serve as member of the committee on account of his other preoccupations and resigned his membership.

The Hon'ble Premier, unable to preside at any meeting of the committee, kept himself fully informed of the proceedings thereof. Hon'ble Dr. K. N. Katju could not take part in the delibrations of the Committee owing to his absence in foreign countries.

Mr. W. W. Finlay could not attend any meeting of the Committee.

8. Terms of Reference—The terms of reference laid down for the Committee require the examination of the various schemes for the development and colonization of Naini Tal Tarai and Bhabar (including Sanwaldeh and Dhela villages and North Kashipur area), North Afzalgarh tract in Bijnor District and certain parts of Lakhimpur-Kheri tehsil with special reference to the points noted below, and to prepare a blueprint of the schemes for the development of the above areas for the resettlement of ex-servicemen :

(1) Measures necessary to eradicate malaria;

(2) The best means of irrigation in these areas consistent with the control of malaria, and, in particular, the possibility of tubewell irrigation;

(3) The communications and roads which are necessary to open up these tracts;

(4) The best method of farming whether it should be on the lines of co-operative farming or State farms;

(5) The disposal of and the terms on which the land should be given to settlers;

(6) The acquisition of land in North Kashipur, North Afzalgarh and Lakhimpur-Kheri from the zemindars and/or their lessees.

Subsequently orders were issued by Government in Revenue (B) Department endorsement no. 2464/I—8-C-46, dated November 7, 1946 to the effect that "the Committee that has been appointed to consider the question of resettlement and development of the Tarai should be requested also to give thought to the problem of development of the settled areas in the Tarai and Bhabar."

9. Meetings of the Main Committee—The Committee met three times, once at Naini Tal, twice at Lucknow. At the preliminary meeting held at Naini Tal on October 21 and 22, 1946, presided over by the Rani Sahiba of Sherkot on the opening day and by the Hon'ble Shri Hukum Singh, Minister of Revenue, on the second day, there was general discussion on the problems besetting the development of the Tarai, and the programme of the Committee was discussed. At this meeting three sub-committees were appointed, (1) Malaria-Irrigation-Communications Sub-Committee to report on the possibility of bringing malaria under control in the areas proposed for colonization and to evolve proposals for the control of malaria and effecting improvements in the means of communications and irrigation, consistent with the control of malaria, (2) Agriculture-Forests-Erosion Sub-Committee to consider problems relating to these subjects and the delineation of the colonization areas, and (3) Farming-Land Disposals-Acquisition Sub-Committee to report on the best system of farming to be adopted, the tenure and terms on which lands may be given to settlers and the method of obtaining lands from the present proprietors by acquisition or through long-term proprietary leases.

The second sitting of the general committee, presided over by the Hon'ble Hafiz Muhammad Ibrahim, Minister for Communications, was held at Lucknow on December 16 and 17 to consider the proposals submitted by the vairous committees, and definite conclusions concerning the entire scope of the enquiry were arrived at. The third meeting of the committee, also presided over by the Hon'ble Hafiz Muhammad Ibrahim was held on March 1, 1947, and the draft report was discussed and finally adopted.

10. Questionnaire—The detailed questionnaire prepared by the Secretary was split up into three sections according to the formation of the sub-committees and was issued for the use and guidance of the sub-committees. The questionnaire was by no means to be taken as exhaustive and each sub-committee was free to add to or amend it in order to fit in with the range of its enquiry. The questionnaire as finally adopted is reproduced in Appendix VI.

11. Meetings of the Sub-Committees—The first meeting of the Malaria-Irrigation-Communications Sub-Committee was held at Naini Tal on October 22, 1946. Mr. Hutchinson was appointed Chairman of the sub-committee and the questionnaire drawn up by the Secretary was referred to R. B. Dr. A. N. Das, Assistant Director of Public Health (Malariology) and Mr. Russell, Superintending Engineer Tube-wells to prepare draft proposals to serve as groundwork for discussion at the next meeting. Major-General G. Covell, Director of the Imperial Institute of Malaria, Delhi, and an Army Officer with experience of the Burma jungles to be nominated by him, Superintending Engineer, Buildings and Roads, Bareilly range, a nominee of the Chief Engineer, E. I. R. preferably Mr. M. S. Ahmad engaged on the Chandausi-Lalkuan Railway project, Mr. Saiyed Ahmad, M.L.A., and Dr. S. N. L. Nigam, Chief Medical Officer of Health, Tarai and Bhabar Government Estates, were co-opted as members of the sub-committee. None, however, could attend the meeting except Mr. Saiyed Ahmad and Dr. Nigam who fully collaborated with the deliberations of the sub-committee. The second sitting of the sub-committee was held at Bareilly on November 5, 1946 at which a scheme was drawn up for combating malaria, improving the means of communications and adopting a system of irrigation within the Tarai region consistent with its requirements.

The Agriculture-Forest-Erosion Sub-Committee was also held at Naini Tal on October 22, 1946. Mr. Hall was appointed Chairman and the questionnaire prepared by the Secretary was amplified in respect to subjects relating to forest, erosion, dairy and poultry-farming. Messrs. C. M. Bowder and M. C. Corbett were co-opted members. The second meeting took place at Dehra Dun on November 12 and 13, 1946 and the third at Lucknow on November 19 and 20, 1946. The sub-committee dealt with the matters on which its report was invited.

The Farming-Land Disposals-Acquisition Sub-Committee met, as in the case of the other two sub-committees, at Naini Tal on October 22, 1946 and appointed Rani Sahiba of Sherkot as its Chairman. The questionnaire drawn up by the Secretary was adopted for discussion and Messrs. Shri Gopal Singh, Deputy Legal Remembrancer, Zahurul Hasan, Deputy Secretary, Revenue, and Ameer Raza, Officer on Special Duty (Revenue) were co-opted members of the sub-committee. The next meeting of the sub-committee was convened at Lucknow on November 8, 1946 and the final meeting at Bareilly on November 30, 1946. The sub-committee evolved its proposals regarding the system of farming, the method of obtaining land from the present proprietors and the tenure by which the settlers should hold it.

On December 1, 1946, the members of the sub-committee, with the exception of Mr. Maya Das who had already toured over the area a few days back and Pandit Ganga Datt Mashiyal who was thoroughly familiar with the tract, inspected parts of the Tarai area in the neighbourhood of Kichha and Rudrapur to acquaint themselves with conditions on the spot.

12. **Acknowledgments**—We are grateful to the Hon'ble Shri Hukum Singh, Minister of Revenue and the Hon'ble Hafiz Mohammad Ibrahim, Minister for Communications, for guiding our deliberations and for the time and the trouble they took to help in a matter for which the best advice and experience were essential. We are thankful specially to Mr. Maya Das, Director of Agriculture, Mr. F. H. Hutchinson, C.I.E., I.S.E., Chief Engineer, Eastern Canals, Public Works Department, Irrigation Branch, Rai Bahadur Dr. A. N. Das, Assistant Director of Public Health (Malariology), U. P., Mr. J. W. Russell, I.S.E., Superintending Engineer, Tube-wells and Mr. C. M. Bowder, Superintendent, Tarai and Bhabar Government Estates, who prepared for our use extremely useful notes and reports on the various problems connected with the development of the Tarai and Bhabar. We are also indebted to those of

our members who constituted the various sub-committees and particularly to Mr. W. T. Hall, C.I.E., I.F.S., Mr. A. P. Watal, Lt.-Col. D. Kelly Rai Bahadur Vinod Chand Sharma, Deputy Secretary, Agriculture, Mr. Shri Gopal Singh, Deputy Legal Remembrancer, Lt.-Col. R. S. Chhattari, Rani Sahiba Phul Kunwari, M.L.C., M.B.E., Shri Shyamlal Varma, M.L.A., Mr. Saiyed Ahmad, M.L.A., Pandit Ganga Datt Mashiyal, Khan Bahadur Sarwat Yar Khan, Pandit Chintamani Pant and Dr. C. D. Pande, D.LITT. for useful suggestions made and assistance rendered.

We would also like to mention with appreciation the name of Mr. M. C. Corbett, who worked in the Agriculture—Forest—Erosion sub-committee unobstrusively, but had done valuable work behind the scene in helping the Secretary generally and Mr. Maya Das, in particular, to write up a note on the Agricultural Development of the Tarai Area.

Finally we should like to take this opportunity to express our appreciation of the hard and efficient work put in by our able and energetic colleague and Secretary, Mr. Radha Kant, who has had to work at high pressure, in addition to his own normal official duties, to complete the enquiry within a short time, and who has prepared an excellent report for our consideration.

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CHAPTER II

DEVELOPMENT OF THE TARAI

13. **Description of the areas**—The physical features and general description of the tracts comprised in the Naini Tal Tarai, Kashipur, North Afzalgarh and Lakhimpur-Kheri Colonization schemes are described in great detail in the various schemes prepared by Mr. Radha Kant and we need not go over the same ground again. These schemes are reproduced as Appendix II to this report, and for a knowledge of the situation and boundaries of the area selected, physical features, drainage and river system, markets and means of communication, rainfall, irrigation facilities, wild animals, health conditions, forests and agricultural possibilities, the reader is referred to the schemes themselves.

14. **Need for the adoption of a long-term policy of vigorous development**—The magnitude of the problem confronting the development of the Tarai has been clearly stated in paragraph 3 of Mr. Radha Kant's scheme relating to colonization of ex-servicemen. We cannot do better than emphasize the importance of the suggestion made by Mr. Radha Kant to the effect that "the real problem of the tract is the making of an effort in a Big Way, and in a manner that may convince the people of the same. Unless a bold scheme of development is chalked out and pursued with all the resources at the command of the Government, I would not suggest the colonization of the area by ex-servicemen." The task is great but we are convinced, after a serious and careful consideration of all the problems affecting the development of the Tarai, that, given a persistent long-term policy with a will to develop the area and necessary financial assistance, the tract can be reclaimed and made reasonably healthy for the settlers.

15. **Existing deplorable condition and hope for the future**—The story of Tarai is very depressing. As admirably summarised by Mr. Russell in his report, "life in most of our Tarai villages is one of continual struggle for existence, against the depredations of wild animals, the rank and vigorous Tarai vegetation, the enervating climate, malaria, bad drinking water, high death rate and infant mortality, low birth rate, bad communications and lack of amenities". An ever-dwindling population is making heroic efforts to stem the tide of deterioration, but the conditions are so precarious that even minor calamities set deterioration in motion. There can be no doubt that such a deplorable state of affairs cannot be tolerated by any Government, much less a popular Government, and that there is urgent need for large-scale all-round development. We are hopeful of the result and feel convinced that the Tarai area can ultimately become an important granary of the Province. In the words again of Mr. Russell who possesses unique knowledge of the tract by reason of his long association with it as Superintendent, "the country itself is most attractive, and could be transformed into a beautiful settlement. But to achieve this it is essential to substitute co-operative effort for the isolated individual efforts of the past, and to adopt and continue to employ effective measures to remove or reduce the many hardships, difficulties and disadvantages which have to be contended with."

16. Objections against development of the Tarai—The hub of the problem in the Tarai is malaria but the matter may more conveniently be examined at a later stage under the relevant term of reference. Doubts as regards the feasibility of reclaiming the area have been expressed by a couple of members of the committee who endorse the views of Sir William Stampe regarding the enormity of the drainage problem and further hold that dangerous sheet erosion is likely to result from any attempt to bring the area under cultivation. These points do not emerge from the particular terms of reference assigned to the committee but may be examined as affecting the development schemes as a whole.

17. Drainage as a serious problem—Basing their judgment primarily on the report of Sir William Stampe, reproduced in Appendix VII, Messrs. Hall and Watal hold that the drainage problem will be insurmountable except at prohibitive cost. This aspect of the problem has already been examined by Mr. Radha Kant in paragraph 4 of his Naini Tal Tarai Colonization Scheme, and we agree with the conclusion reached by him that the drainage problem does not present a serious problem in the particular tract chosen for colonization. We have also taken into account the views of Mr. Russell, Superintending Engineer, quoted in Mr. Radha Kan't report and those of Mr. Hutchinson, Chief Engineer (E) Canals, U. P. who says that the "country slopes are good and there should be no great difficulty in improving the present drainage arrangements." It appears to us that Sir William Stampe had the entire Tarai area in his mind when he spoke of the problem of drainage being beset with considerable engineering difficulties as he refers to hill-fed streams running down in spates as being the major cause of defective drainage. Throughout the Naini Tal Tarai area under examination there is no hill-fed stream except one which is right on the border, and we do not consider that the remarks of Sir William Stampe hold good for the particular area chosen. We have also had the benefit of studying the report of Mr. C. M. Bowder, Superintendent and Executive Engineer, Tarai and Bhabar Government Estates, who conducted a detailed contoured survey of the Naini Tal Tarai area under examination. Basing his conclusions on the survey of levels, he writes, "The survey has served a most useful purpose; it is possible now to locate villages, roads, tube-wells, fences etc. with precision. The survey also reveals that no costly drainage scheme is a pre-requisite to the colonization of the tract. . . ." Referring to Sir William Stampe's objections, he says, "*The objections raised by Sir William Stampe in regard to the faulty drainage of the Tarai do not apply to this particular portion of it*. His main point was that the major hill-fed rivers come down in heavy spate and that on entering the comparatively flatter Tarai they overflowed their banks, and in doing so obstructed the lateral drainage of the tract. But it is only with the least of these hill streams that this particular area is concerned, viz., the Bhakra and by the time it enters the area it is a deep-set Tarai river which rarely overflows its banks." It is abundantly clear from the above exposition of the matter that the drainage is not a serious problem for the tract in view for colonization, and that any such apprehensions should not be allowed to hold up the scheme.

18. Erosion—Mr. Hall holds the view—a view subscribed to *in toto* by Mr. Watal that any attempt at disforestation in the Tarai region is likely to cause sheet erosion of a magnitude which might have serious repercussions on the future well-being of not only of the sub-montane tracts but also of the plains far down below. Mr. Hall has also referred to the consensus of opinion amongst Soil Conservation authorities regarding the importance of forest trees and grass vegetation, in conjunction with engineering works in exercising by far the most effective control of drainage and erosion, more particularly in a region which suffers from heavy annual precipitation causing unusually heavy spates and a steep gradient such as he thinks obtains in the Naini Tal Tarai. Messrs. Hall and Watal consider that any removal of forest cover is bound to be attended with grave consequences, increasing the monsoon discharge with consequent loss of soil.

We are grateful to Messrs. Hall and Watal for pointing out the dangerous consequences of sheet erosion but the main question is whether the longitudinal and horizontal slopes of the country are really so steep as to justify the apprehensions. We have also to see whether any counter remedial measures are possible to prevent erosion in case extension of cultivation in the area is decided upon. According to the latest (1946) survey the gradient within the area proposed for colonization is 16 feet to a mile fading to 5 feet per mile in the south in a longitudinal direction and 15 feet to 1·5 feet per mile in the horizontal direction. In other words, the horizontal slope varies from 0·3 to 0·1 per cent. which is not a steep slope at all. In the Bhabar where cultivation is being done from times immemorial, the gradients are considerably more rapid. Mr. Bowder who carried out the contoured survey considers the longitudinal and lateral slopes as "excellent." Mr. Maya Das who had recently returned after studying the methods of cultivation in America and England does not consider these slopes at all important and is definitely of the opinion that erosion can be controlled by a system of strip cropping as in United States of America and occasional contour bunding wherever necessary. In view, however, of the insignificant slopes obtaining in the colonization area of the Tarai, he did not consider the adoption of the latter course necessary except in rare cases. A system of crop-rotation can be adopted which will not leave any large part of the country without some crop during the monsoon season, so that "crop cover" will take the place of "forest cover."

Mr. Bowder's survey also shows that "the forest area is characterised by enormous grassy plains surrounded by narrow belts of trees, mostly *kukat*, with exceptions noted above (to wit, 20,000 *semal* trees and a few *khair* and *shisham* that need not be felled until actually required), and hence it is not anticipated that the Forest Department will raise any objection to the handing over of the area on the terms suggested (viz., maintenance of a certain percentage under fuel and timber reserves). We take note of the views of the Chief Conservator of Forests expressed on an earlier occasion in his letter no. 189/35-3, dated August 5, 1943 to the Deputy Commissioner, Naini Tal, in which he said, "With reference to paragraph 3 of the Board's letter, the Secretary may be informed that I do not oppose disforestation", and attached a memo. indicating the attidude of the Forest Department. The memo. forms part of Mr. Bowder's survey report contained in Appendix IV.

After a careful consideration of the whole matter, we do not consider that the dangerous consequences apprehended by Messrs. Hall and Watal are likely to ensue to a sufficient extent to affect the scheme, and we feel justified in recommending to Government to proceed with the development and colonization scheme in the Tarai.

19. **Tempo of Development and Colonization**—We considered the very important question of development in the initial stages of the scheme. It was agreed that before the permanent cultivators are brought to the area, houses should be ready; essential roads constructed; drinking water provided; malarial measures started and essential fencing on the outer belt erected. This work should be undertaken at State expense and by Government labour.

Even the labour employed for this purpose will have to be provided with *kachcha* houses (made malaria proof as far as possible) and essential roads constructed at an early stage in order to bring up materials. In the first year, it was considered that Government labour will only be able to operate up to May 1. In addition to these preliminary measures, the area to be placed under cultivation should be ploughed up by means of tractor units. It is envisaged that about 60 tractors will be available and will be able to undertake the ploughing up of, say, about 10—12 thousand acres. We considered that the scheme should progress from the centre of Rudrapur village eastwards towards blocks I and II on the map prepared by Mr. Radha Kant.

We also consider that the permanent cultivators in the co-operative farms should not be brought to the area until the State farm has started functioning. In this regard Mr. Maya Das stated that he was not in a position to state from what actual date the State farm will function but he considered this was impracticable until the anti-malarial measures had reached a stage when the health of the farm labourers could be safeguarded throughout the year.

20. **Lines along which development may proceed**—Subject to what we have stated in the preceding paragraph, development may proceed on the lines indicated in paragraph 16 of Mr. Radha Kant's Naini Tal Tarai Scheme, except that in the matter of fencing we have, as discussed at the appropriate place, preferred wove-wire-*cum*-barbed wire fencing to stone-wall fencing.

21. **Contoured survey of areas other than Naini Tal Tarai**—The contoured survey of the Naini Tal Tarai covering an area of 127,168 acres between the Bareilly-Kathgodam road and the Baur has already been carried out, but the areas proposed for colonization in Kashipur and North Afzalgarh have not yet been surveyed. We consider that it will not be advisable to attempt settlement operations in the Kashipur and Afzalgarh areas until detailed contoured surveys have been carried out. We feel that it would not be possible to make any detailed recommendations regarding the above areas until survey results are available. It may, however, be stated that the general principles underlying our recommendations can be applied *mutatis mutandis* to the other colonization areas suggested, namely, Afzalgarh, Kashipur and Lakhimpur-Kheri. Postponement of development measures in these areas is not desirable either from the grow-more-food point of view or that of the resettlement of ex-servicemen who will be difficult to find two years hence. It is essential

to carry out immediately detailed surveys and to prepare contoured large-scale maps of every tract to be settled before the particular drainage, irrigation and other measures required for each area can be decided on. A list in general terms of the various measures which will be applicable to all tracts can be drawn up; but they will vary in extent and degree and detail in each tract and the actual work which will be needed in each can only be properly ascertained and carried out after detailed survey and careful inspection at site thereafter. These surveys will be required for the following purposes :

(i) for the improvement of existing drainages;

(ii) for locating the alignment and for the design of new drains, where necessary;

(iii) for deciding if and which existing canals should be abolished;

(iv) for aligning and designing new Irrigation channels, if necessary;

(v) for choosing the correct sites for tube-wells, if necessary;

(vi) for selecting suitable sites for village habitations;

(vii) for planning the best layout of plots in the farms and alignment of fencing;

(viii) for locating and designing roads correctly;

(ix) for help in planning the application of anti-malarial measures.

22. **Relationship of area under cultivation and area under forest**—Though not quite within our competence we wish to bring to the notice of the Government certain important considerations affecting the forest areas within the Province and the existing rights of cultivators to timber, grass and grazing. Mr. Hall maintains that according to the unanimous verdict of all the forest authorities throughout the world, at least 20 per cent. of the area should be under forest, if a country is to be self-supporting in timber and fuel. Actually the area under forest in the United Provinces, excluding the inaccessible mountain areas of Kumaun and Garhwal, is only six per cent. and that too very badly distributed, while the area under cultivation in the Gangetic basin is 70 per cent. Mr. Hall is of the opinion that the agrarian balance in the United Provinces is already upset and over-weighted in favour of cultivation and the Government policy should aim, therefore, at increasing the area under forest and pasture. The effect of colonization on the forests is discussed in paragraph 12 of Mr. Radha Kant's Tarai Scheme, and his conclusions are borne out by Mr. Bowder's survey of 1946. The colonization scheme, in its first phase of development, affects only about 10,000 acres of forests, but the whole of this area would actually not have to be cleared of trees, while strips of forest-plantation within the colony are also envisaged in the colonization scheme. We do not feel called upon to state our views in regard to the various matters raised by Mr. Hall but desire to recommend to Government that for every area disforested under the colonization scheme, a similar and larger area should be afforested elsewhere, preferably in those parts of the Province where forests do not exist.

23. **Existing rights of cultivators in the forests**—Mr. Hall has drawn our attention to the existing rights and concessions in the forest block (the Gangapur Pattia block) consisting of 22,566 acres of forest land of which 10,000 acres in the south will be taken up for the first

stage of the colonization scheme. This block is bounded on the north by the Lalkuan-Kashipur railway line; in the east by the Kathgodam-Bareilly road and in the west by the Pathargatti *Nadi*. The rights to grazing are for a maximum number of 15,000 head of cattle, but no definite information is at present available regarding the exact number of cattle grazing in this area. The rights belong to 12 villages situated in the south along or near the Kichha-Rudrapur road and to 6 khattas situated in the north of the forest block and just outside of the colonization area. There are other rights to grass, timber and fuel. The existing rights to grazing present a formidable problem which will have to be dealt with by the Colonization Authorities, for there is no obvious solution except perhaps by provision of land within the colonization area. This might seriously interfere with the anti-malarial measures and the scheme of the layout of the farms which does not include provision of land for the grazing of about 2,000 cattle not belonging to the settlers.

When the second stage of the colonization scheme is put into force between the Dimri *Nadi* and the Baur river, a similar problem will arise regarding existing rights in Dimri, Haripura and Dalpura forest blocks in which there are rights to graze a maximum of one unit of cattle per acre.

Apart from the question of rights, the area to be disforested contains a large number of *semal* and *khair* trees. The *semal* demand for matches and packing cases far exceeds the possible supply whilst *khair* trees over 12″ diameter are now fetching a price of about Rs.100 per tree.

We suggest that the Forest Department should be given ample warning to sell the trees of these two species at least on any area that has to be cleared of tree growth. Wherever possible, suitable trees of other species should be left standing to provide shade particularly along roads, near village sites and in the neighbourhood of all buildings.

24. Development and Colonization of Wastelands in Sanwaldeh and Dhela villages—Mr. Radha Kant has prepared a sceme for the development and colonization of Sanwaldeh and Dhela villages situated a few miles from Ramnagar in Naini Tal District. It is a straightforward scheme and we recommend that the colonization scheme for the culturable wastelands in Sanwaldeh and Dhela villages should be taken up. This is a much less complicated scheme and would present less difficulty than the other areas, but it would involve the acquisition of the zamindari. We understand that the proprietor is willing to sell the land to Government for this purpose. Apart from fencing the area, the only major expenditure involved is the reconstruction of the headworks of the canal. Government may proceed with the development and colonization of the waste areas in these villages at once.

CHAPTER III

RECOMMENDATIONS ON TERMS OF REFERENCE

A—Measures to eradicate Malaria

25. Malaria: the hub of the problem—The importance of the maintenance of public health, as an essential part of the scheme, cannot be over-emphasized. The success of the scheme depends on the measure of control of malaria in particular and the maintenance of the settlers in a reasonably healthy state generally. We have bestowed careful and anxious consideration to this chief problem of the Tarai, and in the formulation of the scheme to cope with the scourge of malaria have been, in a large measure, guided by the recommendations of Major-General Covell, Director of the Imperial Institute of Malaria and our malariologists of the Public Health Department and the report of the Bhore Health Commission.

A short description of the malaria and health conditions obtaining in this part of the Tarai is given in paragraph 11 of Mr. Radha Kant's Colonization Scheme for Naini Tal Tarai and a brief resume of anti-malarial measures that may be adopted is given in Part II, paragraph 11 of his Kashipur Scheme, and need not be re-stated by us.

26. Need for long-range policy—Due to natural malariogenic conditions in the Naini Tal and other Tarai areas, control of Malaria is beset with considerable difficulties. Eradication of malaria from such areas seems to be out of the question at present, but given a long-range policy, persistent efforts and adequate funds the tract can be made fit for healthy living. Results should not be expected immediately, but with the full co-operation of the settlers and perfect collaboration of other departments, much of the disease which may be expected to occur at least in the beginning can be mitigated. As an example of what can be done by such measures in a similar area, one can quote the colony at Banbassa.

27. Pre-disposing causes of the unhealthiness of the tract—The factors which are responsible for the prevalence of malaria are mentioned in Appendix VIII-A of this report. The pre-disposing causes which make this tract especially unhealthy are: climatological (muggy, humid, depressing climate), hydrographical (number of streams. high sub-soil water level) and geological (clayey retentive soil). Hydrographical conditions have been worsened by defective irrigation, roadside burrow pits and haphazard excavation, all of which can be grouped under what is usually called man-made malaria. All these factors combine to make the area the unhealthiest in the Province. Other factors which indirectly pre-dispose to malaria are wild animals which necessitate strenuous night-watching resulting in considerable strain on the vitality of the people, and luxurious vegetation which provides shelter to adults and larvae of mosquitoes. A vicious circle is produced. The humid depressing climate produces inertia which results in increased susceptibility to malaria which in turn produces further sapping of vitality. Bad drinking water further reduces the powers of resistance of the people.

28. Contributory causes of unhealthiness—(*a*) *Thick forests and dense grass*—Forests and dense grass prevent sun and air reaching the ground surface, thus preventing evaporation and increasing humidity. They also harbour mosquitoes. Wide open expanses should be aimed at within the areas which are to be cultivated, and the habitations. The half-mile belt bordering the settlements should be kept clear as a measure of protection against wild animals. The regular cultivation of the land within the colonies, will keep them clear of grass, but any small strips or patches not cultivated may be mowed and burnt periodically. Similar measures to keep the half-mile belt clear would be very costly, and the simplest means would be to burn the grass at intervals when possible but under strict control. It does not, however, appear to be feasible to maintain this belt clear during the monsoon and for some weeks after, as fresh growth is then very rapid, and the ground very moist and wet so that firing the grass will not be feasible. Growth could be restricted by mowing the grass at intervals of about one month by means of tractor-driven power. But this will be expensive and the cost, both initial and recurring, would add considerably to the already heavy expenditure required on these schemes. These operations would also have to be performed during the monsoons under the most trying conditions and it is very doubtful if they would be done properly on the vast scale that would be necessary.

(*b*) *Canal irrigation*—That canals tend to cause water-logging is a fact. The conditions in the Tarai are particularly favourable to water-logging. Sub-soil inflow from the higher levels in the hills and the foot of the hills is great, and tends to force the water up to the surface; the local rainfall is heavy; forest and grass cover aids absorption by the soil, and also retards evaporation in the dry seasons; the climate is highly humid which retards evaporation from the ground, the soil itself is very retentive of moisture; and the natural drainage streams are not all deep enough for effective sub-soil drainage. Canals aggravate these conditions in several ways. Water coming down the streams has first to be ponded up by means of bunds or dams, thus preventing or retarding sub-soil drainage in the tracts above them and often causing inflow to the sub-soil of water which would otherwise have been drawn off by the stream. The interrupted water is then led off over the country by canals from which seepage into the ground occurs continuously; and finally the water is applied to the ground for irrigation, and most of this is absorbed into the soil. Where the natural conditions are already so favourable to water-logging, these consequences of canals cannot but aggravate the conditions. These consequences are inherent in canals, whether well designed, properly aligned, and controlled, or not; but they are worse if not correctly designed and controlled.

29. Measures to control Malaria—A general outline of the steps that should be undertaken for reducing the incidence of malaria and making the tract reasonably healthy for the settlers, as also to avoid creating conditions favourable to the spread of malaria, is given in Appendix VIII-A of this report. A permanent anti-malaria organization, together with other developmental activities, can be the only method of preventing the tract from going into the jungle. To let it lapse into the jungle would be to admit defeat in spite of the resources we now have to fight malaria. Some of the more important and salient measures for the control of malaria may be examined.

30. Sub-soil drainage—The real problem of the tract is not surface drainage but reduction of moisture in the soil, not irrigation but sub-soil drainage. Canals and irrigation in a tract where the spring level is high and soil moist, only make matters worse. The measures to be taken should aim at improving the sub-soil conditions and preventing water-logging. Measures which hinder this must be prevented and those which help adopted. Thus canals should be abolished and irrigation even by other means restricted; and surface runoff should be improved to an extent consistent with the prevention of erosion.

The following measures should be adopted :

(1) All canals to be closed permanently at their heads with the exception of the Paha Canal System;

(2) As far as possible banks and beds of canals should be levelled off. This should be done gradually as the farms are being ploughed up and cultivation extended;

(3) Bunds and dams across rivers to be entirely removed. The foundations and floors and dams must not be allowed to remain, as drainages must be given scope to develop naturally;

(4) The existing natural drainages and streams should be improved to whatever extent this is practicable. Complete canalization is impracticable, and in view of the steep gradients is also not advisable. Improvement and regularizing of the existing channel sections should be aimed at rather than attempting too much straightening. Tortuosity of streams is a physical result brought about by obstructions, inequalities of the ground differences in the soil textures and so on. Physical obstructions in the bed and on the immediate sides of all streams should, therefore, be removed, and the channel section kept clear by regular attention every year;

(5) Bridges rather than causeways should be constructed. A sufficient number of these should be provided at convenient places, so that the need for fords may not arise;

(6) Where water-logging does exist artificial drains should be constructed, and the main stream regraded and deepened, if necessary, at the outfall of the drain, side by side with drainage, lowlying ground may be filled in and graded;

(7) Similar action to (6) should be taken wherever water lodges after rainfall;

(8) Natural streams do not have raised banks. The channels are formed at the bottom of the valleys below the ground surface level, and the ground on both sides ordinarily slopes towards the stream. There is, therefore, no question of river banks breaching. Under certain conditions a spill may occur in high flood, but these

conditions do not obtain as far as we are aware in the tracts in question. If, however, such cases are found to exist, and there is danger of a stream diverting into the spill, the latter should be closed by constructing a bund across it set back a short distance from the stream. Masonry embankments are not required.

(*g*) If water-logging exists, along the sides of streams at existing fords, these should be filled and proper ramps made with shingle.

31. **Tube-well irrigation as a substitute for Canal irrigation**—While canal irrigation tends to cause water-logging and thereby cause moisture and sickness, pumping from the sub-soil would counteract the above consequences. We must tap a source which will draw out water from the sub-soil rather than add to it by a process of percolation from canals. This source is obviously the tube-well which will be a more satisfactory source of irrigation as it will draw off water from the sub-soil while not interfering with the natural sub-soil drainage into streams. If the main irrigation water-courses are made impervious by *pucca* lining seepage from these into the sub-soil will be prevented. But the absorption by the soil of the water applied to irrigated fields will still take place. As, however, this water will have been drawn from the sub-soil and only part of it will find its way back to it, tube-wells will not aggravate conditions, as canals do. The construction of tube-wells is a practical proposition as sub-soil strata conditions are favourable.

32. **Healthy, unpolluted water for human consumption**—All drinking and domestic water supplies should be obtained from tube-wells but water should not be drawn from the first water-bearing strata. Artesian conditions exist over wide tracts of the Tarai but a continuous flow from artesian wells should not be permitted. Self-closing taps should be provided, as otherwise water-logging and pools result, which create unhealthy conditions. Where artesian conditions are not struck, hand pumps should be provided at all tube-wells. When electricity is available later on, small electric pumps and storage tanks can be substituted for these hand pumps.

33. **Selection of village sites**—The following points must be kept in view in selecting village sites:

(*a*) They should be on high ground, free from flooding.

(*b*) They should have good natural drainage.

(*c*) They should be at least half a mile from streams or collections of water or forests.

(*d*) They should be situated centrally with regard to the farms they are to serve, so that all parts will be easily accessible. The farthest holdings should not be more than one mile from the village site.

(*e*) They should be within convenient reach of main roads.

(*f*) They should be properly planned with regard to the general layout, arrangement of houses, roads, drainage, sanitation, water supply, and public amenities.

Residential houses should be—

(*a*) of simple design;

(*b*) provided with adequate floor and air space for an average sized family;

(*c*) well ventilated and airy;

(*d*) made mosquito proof by means of G. I. wire netting;

(*e*) constructed with *pucca* wells and roofs and floors, and

(*f*) provided with a high plinth and a damp-proof course.

For the purpose of anti-malarial control, cultivation of wet crops should not be permitted within four furlongs of the habitation.

34. Thick and heavy over-growth—Suggestions for their removal have already been made in paragraph 28(*a*) of this report. The clearance of patches of thick forests and tall grasses within the chosen boundaries in order to bring the whole of the land into an immense, open and compact block of cultivation, will help to clear the atmosphere and reduce humidity. Furthermore the cultivation of all the land will keep the area clear of tall grass and so remove harbouring places for mosquitoes.

35. Anti-malaria organization—The details of staff, equipments, chemicals and drugs for a unit of 700 houses, or in terms of area, 10,000 acres, are given in Appendices VIII (*a*) and (*c*) to this report. It may, however be pointed out that, multiplied over several units, the cost of organization will not rise in the same ratio in view of the fact that some equipments and apparatus will suffice for two or even more units and that it would not be necessary to increase the superior staff in the same proportion. A recommendation has been made for the appointment of a Chief Medical Officer for co-ordinating and supervising the anti-malaria activities throughout the settlement areas in the Tarai, namely, Tarai and Bhabar Government Estates, Kashipur, Afzalgarh and parts of Lakhimpur-Kheri. The staff for the purpose is detailed in Appendix VIII-(*b*) to this report. This organization, intended primarily for co-ordination and effective superior supervision, may be set up at later stage when the development work is started in all the colonies mentioned above.

B—The best means of Irrigation in these areas consistent with the control of malaria, and in particular the possibility of tube-well irrigation.

36. Artificial irrigation, not a *sine qua non* for development—In view of the heavy annual precipitation (about 50″) and the inherent moisture in the soils, artificial irrigation is not an important pre-requisite to the successful fruition of development proposed in the Tarai. The soil and sub-soil conditions are such that, with the amount of rainfall that is obtained, moisture is retained close to the surface even in the dry months of the year. Mr. Radha Kant, in paragraph 8 of his Naini Tal Tarai Scheme, has quoted figures of very satisfactory out-turn of various crops in unirrigated areas, and this fact was confirmed by our own investigations. It may be possible to obtain somewhat higher yields by allowing irrigation, but that would be at the cost of increasing malaria and sickness around.

37. Irrigation as an insurance against drought—Nevertheless, irrigation will be required for special seasons and for special crops and as an insurance against drought. We have already advocated the abolition of canal irrigation as an anti-malaria measure, and the utilization of tube-wells for the purposes of irrigation. But we wish to suggest restriction of even irrigation from tube-wells. A few wells only should be constructed during the early years at places where spring level is exceptionally deep and irrigation is considered absolutely necessary. In view of the existing irrigation on a fairly large scale from *nalas*, *nadis*, and canals, some members are of the opinion that these sources must not be closed until alternative means of irrigation are provided inasmuch as irrigation is necessary to obtain increased yields.

38. Practicability of tube-wells in the Tarai—In these areas, within the Tarai and Bhabar Government Estates, the successful construction of tube-wells is possible. Numerous borings have been made and tube-wells installed already, many of which are artesian. There is little doubt that the strata conditions in the other Tarai tracts will also be found suitable for tube-wells but a few trial borings should be carried out at suitable places scattered within the proposed settlements to obtain precise data about the sub-soil strata and their water-bearing capacities.

Tube-wells in these settlements should be mainly as an insurance against partial crop failure from drought. The approximate cost of a 1½ cusec tube-well these days is Rs.21,000 including its irrigation channels, *vide* Appendix VIII-(*d*) to this report. The working expenses amount tot Rs.3,500 approximately, *vide* Appendix VIII-(*e*) to this report. To be remunerative to the State the return from irrigation-assessment should, therefore, be at least Rs.3,500 per year. If one tube-well were provided for every 1,000 acres commanded, the assessment per acre—whether irrigated or not—should be Rs.3·5. If irrigation were restricted as has been proposed, a sum of Rs.3,500 would have to be paid by the cultivators, each year as an insurance against drought. From the cultivators' point of view, this would not be a remunerative proposition, as the areas actually irrigated would be very small. State tube-wells in Tarai areas cannot be recommended. If, however, the tube-wells are constructed and held by the settlers as part of their farm property to be run by them at their own expense and only depreciation and interest charges recovered from them, then the annual payment required would be only Rs.1,418 or Rs.1·4 per acre. The settlers would, in addition, have to bear the actual running expenses when they use the well for irrigation. This would be in the neighbourhood of Rs.4 per acre where diesel pumps are used. As an insurance against loss of crop from drought the payment of Rs.1·4 per acre held, plus the actual running expenses when the well is used for irrigation, would not appear to be an unreasonable proposition and should be acceptable. It is, however, unlikely that electric power could be made available for such uncertain demands and it would, therefore, be necessary to instal independent power units, such as diesel engines, for each well. As a large mechanical staff has to be maintained to operate and maintain the farm tractors and other machinery, no difficulty should arise in operating the diesel pumping sets.

39. Tube-wells versus Masonry wells—Doubt was expressed as to whether tube-wells would be able to fulfil the purpose in view inasmuch as tube-wells would draw off subterranean water and not sub-soil water which was one of the main factors for increasing moistness and ill-health. A suggestion was mooted that masonry wells, not more than 20 feet deep, may be preferable and cheap, neither requiring power nor oil. Open wells are, however, exposed to the grave risk of labour and even settlers drinking contaminated water out of these wells and water-collections forming everywhere facilitating breeding of mosquitoes. Moreover, well irrigation puts too great a strain on human and cattle power and makes the cost of irrigation prohibitive. In regard to the capacity of a tube-well to draw off sub-soil water, Mr. Russell, Superintending Engineer Tube-wells, has the following observations to make with the full approval of Mr. Hutchinson, Chief Engineer:

> "Anyone with a knowledge of hydraulics knows that water level is dependent on loss of head due to flow regardless of the depth from which the water is drawn, provided the porous strata was connected. Alluvial deposits are lenticular in formation and there is seldom any continuous separation of the layers at different depths by an impervious strata. In such conditions the water table level is affected regardless of the depth from which water is drawn. There are, however, heads in the Tarai where artesian conditions exist, which points to the presence of a clay layer separating the upper and lower strata. The water in the lower strata below the clay layer is at a higher pressure than that on the larger above so that when the clay is pierced water from below it flows up. It appears, therefore, that the tube-wells in this area should either tap only the strata above or below the dividing clay layer, as, if both were tapped, water from the artesian layers may filter into the upper layers and add to the saturation of the sub-soil in them."

After fully considering the subject in all its bearings we are definitely of the opinion that, under the existing conditions in the Tarai, the tube-wells provide the best means of irrigation.

40. Source of power in the absence of hydro-electricity—In view of the very special conditions which will obtain in these tracts, and the uncertain demands for irrigation, as already mentioned, the supply of hydel power would not be remunerative either to the State or the tenants, and the pumping plant will, therefore, have to be provided with independent power units. For this purpose, separate diesel engines would be most suitable. Tractors with power take-off could be used, but there are two main objections to using them for this purpose. Firstly they would have to be taken off their other agricultural operations to deal with pumping, and this would upset the whole agricultural programme. Secondly, the H. P. of these tractors would be 40 to 60 whereas the power required for the pumps would be about 10 H. P. only; so there would be a useless waste of power and consequently higher working expenses. Since the cultivator would be paying for depreciation and interest on the plant even when idle at the rate of Rs.1,418 per well per year, it would be more economical as well as more suitable and convenient to instal separate power units, as running expenses will be lighter.

As irrigation will not be a regular feature of the agricultural operations on these farms, it is impossible to work out the economic aspects with any degree of certainty or accuracy. An attempt has, however, been made in Appendix VIII-(*f*) to this report to show what the cost of irrigation by diesel power units would be, excluding the fixed interest and depreciation charges which would be paid annually. The cost per acre watering is Rs.4, but as a single watering is all that is likely to be required for a crop, this is not excessive.

Diesel engines are likely to be in great demand and very difficult to obtain in large numbers during the next two years, and hydel power is not expected within the above period. We, therefore, suggest the installation of two or three big oil engines with a view to generate electricity for the electrically-driven pumps to lift water. When hydel is obtained, switching over can be completed without much expense and difficulty.

C—The Communications and roads which are necessary to open up the tracts

41. **Deplorable condition of means of communications**—The present rail and road communications of the Tarai can only be described as deplorable and render the region one of the most inaccessible in the Province. The villages in the interior are totally cut off from the outside world, and what this means cannot be fully realised until one has seen the existing roads in the muddy state which is their normal aspect for about half the year. A brief description of the means of communications together with suggestions for their improvement is contained in paragraph 6 of Mr. Radha Kant's Naini Tal Tarai Scheme.

42. **Urgency of improvement of road communications**—As remarked by Mr. Russell, "adequate and good communications must form an important part of the scheme. Good roads and prosperity go hand in hand. Good roads not only lead to development, but the extent and the state of communications reflect the degree of economic improvement of a country. It is important, therefore, that at the very outset, the scheme is not handicapped by the lack of good communications." Much as we would have desired to recommend the entire road construction programme suggested by Mr. Radha Kant, we are constrained under the over-riding considerations of finance to recommend the metalling of only the following roads in order of priority:

(*a*) *For Tarai and Bhabar Estates*—

(1) Rudrapur-Tanda-Lalkuan,

(2) Rudrapur-Gadarpur,

(3) Darao along a new alignment between the Barai and Baraur *Nadis* to Kichha-Rudrapur road.

(*b*) *Kashipur Area*—

(1) Kashipur to Ramnagar (already in progress),

(2) Kashipur-Lalpur-Garhi-Negijhagarpur-Gaushala-Pipalsana.

(3) Kashipur-Jaspur.

(*c*) *Afzalgarh Area*—
Afzalgarh to Kalagarh.

43. Chandausi-Lalkua Railway project—The Railway Board are considering a project for laying out a new railway line from Chandausi to Lalkua via Rampur and Rudrapur. The Committee recommend that while doing the final location survey of the proposed railway line between Rampur and Lalkua, the Railway Board should also investigate the possibility of taking a line from Rudrapur to Haldwani via Tanda, and abolishing the line between Tanda and Lalkua. This suggestion is being made in order to avoid the possibility of any deterioration to cultivation by obstructing drainage and also with a view to taking the railway line through the middle of the colonization area and close to the main town which would be sited on the main watershed between Rudrapur and Tanda.

In the event of the Railway Board deciding to align the railway as suggested above it will be advisable for the Chief Conservator of Forests to extend his 2′ gauge railway from Lalkua to Tanda as Lalkua would no longer be a junction. The Chief Conservator of Forests should be asked to confirm that there will be no insurmountable difficulties.

D—The best method of farming? Whether it should be on the lines of Co-operative farming or State farms

44. Need for a change in the age-old method—We have discussed the various systems of farming and have had the benefit of gaining an insight into the practical working of a co-operative enterprise in the Fen country of Cambridgeshire in England, which was explained to us by Mr. Maya Das, our Director of Agriculture, who has recently returned from a study tour of England and America. There can be no doubt that the individual system of farming which has been handed down to us from an ancient past has out-lived its utility. It did well at a time when money was cheap, lands were ample and to spare, population was sparse and one grew food-crops as one pleased. With the advent of the machine age, a new era arose dissolving what remained of the old Indian Village System, based on the union of primitive agriculture with hand-spinning and hand-weaving in their crude form, and driving millions of craftsmen to draw their livelihood solely from the land. With increasing population and diversion of the erstwhile non-agriculturists to land, the pressure has increased considerably while the productivity of land remains static. Little attempt has been made so far to explore new paths, although the task of increasing land productivity and increasing the area under cultivation remains as urgent as ever.

45. Various systems of farming examined—This is the problem to solve for which we have to devise a new, more productive system of agriculture to replace the present peasant system with each family cultivating a tiny holding, often of hopelessly fragmented land. Some form of large-scale farming with improved methods of agriculture, more judicious crop planning and utilization of improved seeds and manure, based on co-operative or collective effort, is clearly indicated. The individual farmer cannot be expected to be possessed of the wherewithal with which to achieve the above purpose and carry out large-scale development.

Various experiments with farming have been made in different countries of which the following are quoted as the more important instances :

Collective Farming—It includes full communes in which there is little or nothing in the way of personal belongings, ordinary communes (*Artel*) in which a little private property, such as a kitchen garden etc., is permitted, and a few other types which vary according to the nature and the extent of the ownership rights in the land exercised by their members and certain other matters relating to the allocation of labour and the method of sharing the produce. The economic system of the Russian model is based on the Socialist ownership of the means and instruments of production. Ownership is vested in the State or rather the community. In a collective farm all the principal instruments and means of production are pooled as common property—all the draught-animals, agricultural machines, seed-stores, fodder, farm building needed for running the farm and all instruments for processing the produce of the collective farm. Collective farmers are paid on "work-day unit" basis according to the quality and quantity of work performed. The working of collective farms is elaborately described in Mr. Maya Das's note on Agricultural Development (Appendix IX).

State Farms—Both the land and the other resources of State farms remain the property of the Government, and the cultivators, apart from an assurance of daily wages, have no responsibility in the organization of the farm, nor any share in the profits, and there is little inducement to individual effort. At best the State farms are meant to give encouragement, both direct and indirect, to the modernisation of agriculture so that every kind of scientific advance and labour-saving advice is readily put to use.

Co-operative Farming—This phrase is used to describe a system in which holdings of individual peasants remain distinct but co-operation is extended to a number of agricultural operations, marketing and processing of the produce and the use of agricultural machinery. Types of co-operative farms will vary in accordance with the degree of ownership exercised and methods adopted for the disposal of land and resources of the farms and the sale of the produce, and in the operations of farming.

46. Collective farming not suitable to Indian conditions—As is apparent from the brief description of co-operative farming given above, the Russian model is wholly foreign to the Indian concept of proprietorship and social relations. In India we have a long tradition of individual ownership deeply ingrained in the mind of peasants, a right valued and freely exercised since the earliest recorded times and in the enjoyment of which the peasant feels a sense of security as well as an opportunity of obtaining his livelihood, both of which are a source of enthusiasm for and pride in agricultural effort. In reorganizing our rural economy, therefore, we must have the peasants with us, and not against us. The process of evolution, even to reach the ideal, must in the circumstances be gradual, well-measured and well-planned.

47. Co-operative farming stepping to Joint Farm Management as the ideal—The State farm has its definite sphere of action and is of limited utility. It cannot be advocated for general application as it will merely reduce the cultivators to the status of labourers. Co-operative farming is then the only answer for the solution of our problem. If, however, agricultural development has to be effective and conducive to the raising of the general standard of living it must also attempt the task of reorganizing the whole of village life. The aim should be to transform the peasant communities into co-operative societies employing modern methods of agriculture and running small-scale cottage industries ancillary to agriculture. If we reorganise our peasant villages on the basis of Joint management, village artisans can be better organized, equipped and trained, and a great deal of processing of local products can be done in the villages by the villagers themselves. By a process of peaceful change, democratic institutions will develop gradually out of village councils managing the common concerns of co-operative village communities, linking up ultimately with District Councils and finally with Provincial Councils. Joint farm management is perhaps the most concrete and immediately practical form in which one can express the general idea of co-operative farming.

The point was stressed by the Policy Committee on Agriculture, Forestry, and Fisheries at a meeting held in April, 1945, in its recommendations for the institution of pilot experiments to determine the relative merits of different forms of farm organization, which are contained in the Government of India, Development Board letter No. 310/RC., dated 2/7 November, 1946, addressed to all Provincial Governments, from which the following is quoted in *extenso* :

> "3. Broadly speaking, reform must be in the direction of an increase in Co-operative Farming. This term may, however, be used to describe a number of somewhat different systems between which it is desirable to distinguish :
>
> (*a*) At one end of the scale it may be applied to a system in which individual holdings remain distinct and are cultivated separately, but the owners co-operate for certain specified purposes, e.g., marketing of produce, purchase and use of implements etc.
>
> (*b*) At the other end of the scale it may be applied a complete system of Collective Farming in which all land is pooled, all rights of ownership and occupancy disappear, and the members of the Collective Farm receive payment simply in accordance with the work which they put in.
>
> (*c*) Midway between the two, it may be applied to a system

of "Joint Farm Management" under which land is pooled by consent or agreement for the purpose of farming operations, but the individuals contributing land to the common pool receive, in addition to a dividend based on the work which they put in, as based on their original rights of owner occupancy. This type of Joint management can be extended to other village activities besides farming, e.g. the management of village industries, so that it might expand into "Joint Village Management."

4. It is obvious that the actual pooling of land will nowhere come about easily, but only slowly through experiment and demonstration, while in some areas, it will not be feasible at all. Nevertheless it is considered that over wide tracts of the country the pooling of land, at any rate for purposes of management as contemplated in (*c*) above, should be the goal and that pilot experiments in this form of organization should be instituted without delay.

5. Such experiments can most easily be undertaken in areas which are being brought under cultivation for the first time as a result of new major works of irrigation. In such areas regular State Farms could also be started with advantage. It is, however, also possible to undertake pilot experiment—

(1) in any areas where new village communities are, from whatever cause, being established on land for the first time;

(2) in selected areas in which Government is prepared to assist actively with capital investment and provision of trained personnel.

Many Provincial Governments have plans for settling ex-service personnel on the land in new village communities, but in most cases only a limited degree of co-operation, such as described in paragraph 3(*a*) above appears to be contemplated. The Government of India consider that where new communities are to be established an opportunity should be taken for bolder experiments in co-operation of the "Joint Farm Management" type.

Furthermore, though the new communities may furnish the easiest field fod experiment and demonstration, the more difficult task of transforming existing villages into co-operative units should not be neglected. They suggest, therefore, that, if possible, this should also be attempted in carefully selected villages.

6. Success will, of course, depend largely on the staff employed which will have to be composed of men not only imbued with a missionary zeal but also possessing knowledge and experience of farm management and co-operative technique. I am to suggest, therefore, that Provincial Governments should consider making arrangements to provide for training in co-operative farming, possibly by sending a small number of persons to foreign countries where systems of collective or co-operative farming are actually in operation. Success will, however, also depend to a

> great extent on the inducements which Governments are prepared to offer in the way of free technique, advice, electrical and irrigation facilities and improved implements, improved seed, manures etc. at subsidised prices.
>
> 7. Experiments of this character which Provincial Governments may decide to undertake will be eligible for financial assistance from the Centre on the same basis as other post-war development schemes. The Government of India will be glad to be informed of any decisions which Provincial Governments may take in this regard. They themselves intend to carry out a pilot experiment in one of the Centrally Administered Areas. They also hope, that when the time comes, it will be possible to carry out large-scale schemes of co-operative organization in areas served by multi-purpose river development projects."

48. Co-operative Farm Management in the Tarai—We recommend the adoption of co-operative principles in farming in the Tarai to as great an extent as possible—co-operative credits, co-operative farming, co-operative marketing, co-operative stores, co-operative processing, to name some of the main activities along with the development of Cottage Industries, so that the co-operative enterprise may expand into a "Joint Farm Management". While almost the entire area will be under co-operative farming, we recommend that there should be one Central State Farm of 1,000 acres and one Collective Farm of 1,000 acres for each colony of 50,000 acres. The purpose of the former would be to provide seed, demonstration areas and deal with research problems for the particular tract while the latter will be purely for experimental purposes. The Tarai lands are largely free of any vested cultivatory interests, and it is proposed to settle them with ex-servicemen who would make the best use of that training in corporate life, efficiency and discipline which they have learnt and practised in the services.

49. Mr. Maya Das's note on Agricultural Development of the Tarai—In consonance with the principles that we have accepted, Mr. Maya Das, Director of Agriculture, has prepared an elaborate note on Agricultural development in the area, making separate recommendations for staff, equipment, and other materials required for (i) Central State Farm, (ii) Collective Farm and (iii) Co-operative Farm. While the first two will be directly managed by the State, the last one will be run by co-operative societies for whose guidance also he has given all necessary particulars. Mr. Maya Das's note is reproduced in Appendix IX.

50. Recommendations for Agricultural development in brief—(*a*) ***Farming on Co-operative lines***—The main feature of the development is farming on co-operative lines, managed by the members under the guidance of a Co-operative Officer. In addition, there is provision for one State Farm and one Collective Farm of 1,000 acres each.

(*b*) *Method of ploughing*—While the aim should be the introduction of mechanical cultivation as we embark on a colony with practically no vested interests, almost with a clean slate as it were, it cannot be accomplished all at once due to the limitations of finance and non-availability of machinery. The preliminary work of breaking up the land and of occasional breaking every 3 or 4 years will be based on mechanical ploughing with tractors and the subsequent operations will be done by bullocks and bullock-drawn implements. The Tarai lands, however, have a tendency to become extremely weedy, and it will be necessary to give all cropped land one tractor ploughing and discing every three or four years until the incidence of weedy vegetation is brought under control. This plan makes it unnecessary for each co-operative farm to own its own unit.

(c) *Motor Tractor Station*—It is desirable to separate the Tractor and the Truck organization, for economy and efficiency's sake. The pooling of tractors under one centralised unit, located on the State Farm, will make for the utilization of the tractor-power fully and economically and assure better chances of proper maintenance and longer life. All the tractors should be the property of the State, or if considered more advantageous by the societies, they may be owned jointly by them as an item of their investment. Each Society will pay for the work done by the tractors.

(d) *Lay-out of the colony and farms*—The plan of the lay-out makes adequate provision for dwelling houses and open spaces for orchard, *maidan* and for community buildings. About half an acre is attached to each household for the keeping of a kitchen garden or small livestock. A system of crop rotation suitable for the area has been proposed. A feature of the rotation is the introduction of sufficient fodder for the maintenance of draught and milch animals by cultivating grasses (including clovers as Bersem, Guinea or Napier grass, *juar* and oats) on the system of "Ley farming". The lay-out of each 1,000 acre farm envisages actual cultivation on 800 acres in four equal blocks divided into strips of 10 acres each in the co-operative farm and 40 acres each in the State and Collective Farms for facility of mechanical cultivation.

(e) *Irrigation*—Capital expenditure on the installation of tube-wells is contemplated as State preserve until hydel is available. The farms will pay for service.

(f) *Agricultural Staff*—An agricultural staff, under a Director of Farms, sufficient to control farming operations in one State Farm, one Collective Farm and three co-operative farms has been suggested on a liberal scale due to the difficulties likely to be experienced in the initial stages of development. The organization proposed is, however, capable of dealing with further extensions in cultivation as development proceeds, and is in point of fact capable of administering a much larger area. The staff on the co-operative farms can be paid for from the profits of the Societies.

(g) *General*—Provision has been made for the maintenance of research workers in view of the difficulty of obtaining any information on the incidence of insect pests and fungoid diseases, chemical, physical and bacteriological properties of the soil and the possibilities of improved varieties of crops in the area.

(h) Financial Aspect—

——	Expenditure		
	Non-recurring	Recurring	Estimated annual returns
	Rs.	Rs.	Rs.
Administrative organization (Agriculture)	35,000	24,000	..
Research organization	..	16,000	..
M. T. S. Centre	3,21,000	1,46,000	..
Central seed store	10,000	4,000	..
State farm organization	3,77,000	1,86,000	94,000
Collective farm organization	2,89,000	1,51,000	1,64,000
Co-operative farm organization (for a unit of 3,000 acres).	..	43,000	24,000

The non-recurring expenditure on co-operative farming will be the investment made by the Society. In addition to the above, co-operative farms will require loans amounting to Rs.3,21,550 to purchase agricultural stock and implements. Mr. Maya Das has made liberal provision for a large staff for supervision of co-operative farming to safeguard development on right lines, but there is no justification for the entertainment of a huge staff without commensurate returns from the undertaking. This staff should be paid for by the Co-operative Society if it feels the necessity for the employment of such a large staff, and the Government should have a skeleton staff only to give technical advice. Service charges of the M. T. S. Centre and Central Seed Store will be met by the various farm units. The non-recurring expenditure under State, Collective and Co-operative Farm organizations includes land clearing charges of Rs.20,000 under each head, already provided for in the forecast of general development budget.

E—The disposal of and the terms on which the land should be given to settlers

51. Colonization areas to be leased out to Land Settlement Co-operative Societies of Settlers—We are definitely of the opinion that all crown lands and other lands acquired from zemindars should be leased out to the Land Settlement Co-operative Societies of Settlers, which will then allot land to individual settlers who would be deemed hereditary tenants of a special type. We understand that sample by-laws for such societies have been received from the Government of India. They should be examined by the Co-operative Department of this Government in consultation with the Director of Colonization, whoever is appointed, and be made a part of the Bill which we propose for enactment for the better administration of Land Settlement Co-operative Societies and in the interest of the settlers themselves.

52. **Terms on which the land should be given to settlers**—We have suggested certain terms on which the land should be given to settlers. They are incorporated in the draft bill given below and we recommend to Government to promote legislation to the effect that a lease granted by the Land Settlement Co-operative Society shall *inter-alia* be subject to the following conditions :

(1) That no tenant shall be granted lease of more than ten acres of land for cultivation, besides any area, not exceeding one acre, given to him for the construction of his house, kitchen-garden, and any other purpose approved by the Society.

(2) That the lessee shall abide by the by-laws framed by the Society for the purposes of co-operative cultivation, harvesting and marketing and purposes incidental thereto, e.g. maintenance of livestock, orchards, pastures or growing of cultivated grasses (Ley farming).

(3) That the lessee shall use the land granted to him only for the purposes of cultivation and other incidental purposes and for no other purpose.

(4) That no land let out to any tenant shall in any way be partitioned and the succession to such land shall be regulated according to the law governing impartible estates.

(5) That no tenant shall transfer or otherwise alienate any land let out to him except with the written permission of the Land Settlement Co-operative Society and such permission shall be given only in accordance with the by-laws. Any transfer or alienation made in contravention of this condition shall be void.

(6) If any tenant abandons his holding, house or other immovable property, the same shall revert to the Society and the tenant shall not be entitled to any compensation.

(7) That a tenant shall not be liable to be ejected from the land let out to him except if he commits breach of any of these conditions, in which case he shall not ne entitled to any compensation.

We further suggest that the proposed legislation should also provide for fine not exceeding Rs.25 for the contravention of any by-laws other than those mentioned in the above Resolution and that such fine shall be recoverable. The model by-laws should be made a part of the proposed Bill by including the same in the schedule thereto.

53. **Stopping of accrual of further rights in the land**—It has been brought to our notice that certain substantial leases have been executed in favour of other persons or corporate bodies in the areas for which colonization schemes have been submitted for the consideration of Government. This is likely to defeat the

purpose of development and colonization and to create additional complications. We, therefore, recommend that the Government should take speedy steps to stop acquisition of any rights, agricultural, horticultural, residential or farming, in lands already under consideration for development and colonization. Rani Sahiba of Sherkot is of opinion that it would operate harshly on the zamindars if they were prevented from letting out their lands indefinitely.

F—The acquisition of land in North Kashipur, North Afzalgarh and Lakhimpur-Kheri from the zemindars and / or their lessees

54. **Sub-Committee in favour of 99 years proprietary lease from zemindars**—The sub-committee which was appointed for the examination of the matters relating to farming, land disposals and acquisition recorded its finding against the acquisition of proprietary rights in the land and recommended that zemindars should be asked to execute leases in favour of Land Settlement Co-operative Societies of settlers for a term of 99 years renewable at the option of the lessee. Detailed terms of the proposed lease are contained in Appendix VIII-(g) to this Report.

55. **Acquisition of proprietary rights recommended**—After anxious and profound consideration of the matter, we find ourselves wholly unable to agree with the recommendations of the sub-committee. It has been suggested in the draft proporietry lease that the Land Settlement Co-operative Society will pay annual lease money to the zamindars at the rate of Re.1 per acre for six years, and Rs. 4 per acre thereafter. In Afzalgarh alone, for instance the Society will be called upon to pay Rs.24,000 a year in the first six years and Rs. 96,000 a year ever afterwards, and this against an estimated acquisition value of Rs.3½ lakh and without any trouble or expense on the part of zamindars. It must be remembered that on the well-being of the Society depends the prosperity of the tract and the success of the development scheme. It will be impossible for the Society to bear the shock and the strain of the sudden shooting up in the amount of lease-money at the end of six years. The Society should not be called upon to pay more than a certain percentage on the land revenue and should not be financially overburdened. This is only possible if the areas intended for development and colonization are acquired from properietors either by private negotiations or according to the procedure laid down in the Land Acquisition Act. Furthermore, as a matter of cardinal principle, we consider it highly undesirable that the land over which the Government stands committed to heavy investments should belong to anyone else but the Government.

G—Development of the settled areas in the Tarai and Bhabar

56. **Appointment of Sub-Committee for examining settled areas**—Apart from the question of reclaiming culturable wastelands, we also gave anxious thought to the problem of developing settled areas in the Tarai and Bhabar. Though the problem is of a kindred nature and the lines on which development will proceed will be almost similar to those recommended by us in this report, we have considered it desir-

able, for a variety of reasons, to consider the matter separately and to submit a separate report to the Government. Resettlement of ex-servicemen is financed by the Central Government to the extent of one-third of the over-all expenditure subject to a maximum of Rs.500 per settler, while certain grants-in-aid are also made available from the Post-War Services Resettlement Fund. There are different rules for the selection of colonists from amongst ex-servicemen and for allocation of land. We have, therefore, appointed a separate sub-committee to submit proposals for the development of settled areas in the Tarai and Bhabar within a month. The following persons were appointed to serve on the sub-committee :

(1) Shri Shyamlal Varma.
(2) Pandit Ganga Datt Mashiyal.
(3) Khan Bahadur Sarwat Yar Khan.
(4) Major M. A. Akmal.
(5) Rai Bahadur Prem Ballabh Bilawal.
(6) Pandit Moti Ram Dumka.
(7) Shri Hira Lal Arya.
(8) Mr. Saiyed Ahmad.
(9) Pandit Chintamani Pant.
(10) Mr. R. N. Agarwal.
(11) Chairman, District Board, Naini Tal.
(12) Superintendent Tarai and Bhabar Government Estates. *Member-Secretary.*

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CHAPTER IV

OTHER RECOMMENDATIONS PERTINENT TO THE ENQUIRY

57. **Cattle Breeding and Dairy Farm**—The tract is very well situated for cattle-breeding and dairy farming. Provided that effective measures are adopted to combat malaria, the incidence of cattle grazing is controlled, fodder crops are grown and that good cattle are maintained, cattle breeding and dairy farming can be adopted with success. The colonization area is centrally situated between two large milk-consuming centres. The Director of Animal Husbandry has prepared a small note on cattle-breeding and dairy farming with a herd of 100 cattle to begin with. The financial aspects are examined in the note which is reproduced in Appendix X. An initial capital outlay of Rs.2,12,700 non-recurring and Rs.88,000 recurring is involved. A deficit of Rs.10,000 is anticipated which is, however, solely accountable to the low price of milk estimated at four seers to a rupee. The Committee recommends that cattle breeding and dairy farm should be started at once and a farm of 500 acres should be set up somewhere near the headquarters of the colony for the purposes of research and dairy farming and for the provision of good bulls of the local breed as well as for raising good bulls of the *Hariana* and other imported breeds.

58. **Mixed Farming**—We suggest that the maximum number of cattle which each settler should be allowed to maintain should be laid down and satisfactory arrangements should be made for their grazing. In order to allow for this, a system of mixed farming should be adopted throughout the colonization area.

59. **Poultry Farming**—We consider the colonization area suitable for poultry farming as large consuming centres exist both on the plains and in the hills. There is a great demand for table poultry and for eggs which are a valuable food, and recent research on vaccine for dealing with Ranikhet disease has now reduced the danger of "putting all one's eggs in one basket." Though there are possibilities of starting poultry farming on commercial basis, combined with fruit and vegetable growing, we think that a beginning may be made by each individual settler providing himself with his own chicken run, the produce being sold on a co-operative basis.

60. **Fisheries**—We also discussed the possibility of developing fisheries so as to provide more protein food for the settlers. There are, however, difficulties in the way. The usual varieties of edible fish are not present in the streams of the Tarai except the *Kalabans*. As an experimental measure fingerlings of the other three varieties of carp (*rohu*, *katla*, *nain*) have recently been put in a tank in Kashipur, but no definite results have yet been obtained to guide us to any definite conclusions. Moreover, the small streams passing through the colonization areas normally dry up during the hot weather and will be unsuitable for the development of fisheries. There appears to be some possibility of developing fisheries in rivers like the Baur and the Bhakra which are on the borders of the colonization area, and perhaps in the lower reaches of the Dimri. There is a case for further investigation

including other places also within five miles of the headquarters of the colony.

61. Cottage Industries—The possibilities and prospects of cottage industries are already discussed in paragraph 27 of Mr. Radha Kant's Tarai Scheme. We confine ourselves only to the enunciation of broad principles. As a large number of the service personnel is trained in cottage industries before demobilization, it would be easier to start cottage industries. We are opposed to the idea of any syndicate or private enterprise being allowed to run these industries and would strongly urge the desirability of starting cottage industries including subsidiary industries allied to agriculture on a co-operative basis. The Land Settlement Co-operative Society may serve as a nucleus for a multi-purposes society, supplying raw material for such industries as may be established in the area, giving improved tools and implements to the colonists and marketing the produce for them. As regards capital only a small amount will be required, which can be obtained either from the Society's own capital or additional funds could be floated or funds advanced by co-operative banks. One of the greatest need of cottage workers would be State-aid towards remunerative marketing and improvement of traditional designs and the introduction of new ones. Help and guidance as regards both marketing and production will be the special responsibility of the Industries Department.

62. Fuel and Timber Plantation—In any reclamation scheme, agronomical balance must be maintained between agriculture, pasture and fuel and timber reserve. Ill-balanced rural economy, resulting in thoughtless extension of cultivation at the cost of grazing lands and fuel reserves recoils on itself by the operation of the law of diminishing returns. With regard to pasture, it would be unnecessary to set aside special areas for grazing as under the system of farming we have suggested, pasture is provided for under the system of "Ley farming". It will be necessary to set aside and demarcate a specific area as a forest plantation close to each village, to provide fuel and small timber for the settlers. In addition to this certain areas of forest, outside of the colonization area, should also be set aside to provide other forest produce to the villages. The forest areas should be allotted so as to make as short a lead as possible to each particular village, consistent with malaria control and agricultural operations. We are of the opinion that village plantations should be provided for in the lay-out and that each plantation should consist of at least 100 acres.

63. Type of fencing required—In view of the close proximity of the sheltering forests, protection of cultivation from the depredations of wild animals is a special problem. In the northern vulnerable area, it is proposed to clear a belt half a mile wide and on its southern perimeter to erect a fence to keep off wild animals. We have considered various forms of fencing including a stone wall. The stone wall is out of question because of its immobility, high cost involved and difficulty of maintaining it in proper repairs. Of fencing, two types merit consideration;

(*a*) a fence consisting of four strands of wire of which two are electrified by means of battery sets, and

(*b*) a wove-wire-*cum*-barbed wire fence, a description of which is contained in the United Provinces Forest Department Bulletin of 1930. The cost of electrified fencing approximates to Rs.14,200 a mile and that of wove-wire-*cum*-barbed wire fence to Rs.5,500 a mile. The latter is a feasible and economic proposition and may be adopted for erection with reinforced concrete pipes. The problem remains how to deal with the streams running through the colonization area. We are not in favour of taking down the fence for a mile down the sides of the stream on account of its operating as a death trap to animals and needless expense involved, and agree with Mr. Watal that reinforced concrete pipes should be placed in the stream which would form a bridge over which wire fencing would be taken. A design could be made with spikes to keep off the accumulation of debris as a result of spates.

64. Area of New Villages—We are of the opinion that villages should be sited to suit the configuration of the country and should, in the interest of cattle and agricultural operations, only control areas varying from 1,000 to 3,000 acres. Cattle, in addition to mechanical equipment, will have to be used and they should not have to travel very far to and from their work. Villages exceeding 3,000 acres will, in our opinion, be impracticable.

65. Full cultivated villages—As far as possible villages, falling within the colonization area where lands are already under cultivation and just enough is left for grazing purposes, should be excluded from the lay-out and no interference should be made with the existing right except in so far as may be necessary for making the farms and holdings compact or in the interest of planned farming and anti-malarial measures. Similarly existing residential sites should not be affected.

66. Facilities to settlers—We strongly recommend to Government that the settlers should be provided with every possible facility in the initial stages of the schemes including free fencing, use of tractors, drainage, roads, hospital, domestic water supply etc. In the first few months, the settler will have to bear the expenses of maintaining himself and his family until the harvest is gathered and over objects incidental to new cultivation, and in order that he may not be discouraged or broken down ultimately, it will be necessary for the Government to allow him the free use of the above things and also a short-term loan to meet his essential requirements.

67. Special pay to staff working in the Tarai—We recommend that any officers and subordinates selected from existing departmental cadres for work in the Tarai Settlement areas should be granted a local allowance of not less than 20 per cent. of their substantive pay in view of the unhealthiness of the area and the arduous nature of the duties which they will have to perform. They should also be granted rent-free accommodation.

CHAPTER V

DEVELOPMENT BOARD : ITS CONSTITUTION

68. Need for a separate Board of development for the Tarai—In view of the stupendous work involved in the development of the Tarai area, we recommend that there should be a separate Development Board for the area with two distinct branches for carrying on the work, **(1) the Administrative Branch, and (2) the Executive Branch, the** former to lay down the policy and guide the work and the latter for actually carrying out the work. In order to secure the co-ordination of all the different departments concerned with the development of the area and to associate no-official opinion with the work of development, it would be advisable to have the following on the Administrative side of the Board :

1.	Deputy Commissioner in charge of Kumaun Division	*Chairman.*
2.	The Chief Medical Officer of Health, Tarai and Bhabar	*Members.*
3.	One Engineer of the B. and R. Branch, Incharge of that Division	
4 & 5.	Members of the Legislature	
6.	One Representative of G. H. Q.	
7 & 8.	Two Representatives of Tenants in the Tarai and Bhabar	
9.	One Representative of the Resettlement Directorate nominated by the Regional Director	
10.	Forest Officer in charge of the T. and B. Estates Forest Division	
11.	Veterinary Oficer in charge of the circle ...	
12.	Assistant Registrar, Co-operative Societies, of the Circle	
13.	Superintendent, Tarai and Bhabar ...	
14.	An Officer of the Agriculture Department ...	
15.	Director of Colonization	*Member-Secretary.*

A view was expressed that a permanent high-powered officer should be at the head of the Development Board as in the case of Improvement Trusts. Another view was that an Hon'ble Minister or Parliamentary Secretary may be the Chairman of the Board. We leave this matter to be decided by Government.

For the Executive Branch we are of the opinion that the entire development staff should be under the Director of Colonization. We considered whether it would be proper to let each department do its job but the important and heavy task of development requires a singleness of purpose and concentration of efforts such as can be achieved only under one Department and one organizing officer. We, therefore, recommend that the Director of Colonization should be allowed to recruit his staff, as far as possible, from the released personnel, and that this staff should work under his control and subordination.

69. Establishment of a Tarai Planning and Construction Division—The resettlement of ex-servicemen brooks no delay as they should not be allowed to dissipate their hard-earned money, nor does the acute shortage of foodgrains allow of any procrastination. The amount of planning to be done and the construction work inherent in the Development scheme will be very great. It is necessary that a Planning and Construction Division should be opened for the Tarai with headquarters at Rudrapur, under an Executive Engineer who will work directly under the control of the Director of Colonization. The jurisdiction of this Division will extend in the first instance, to the part of the Tarai lying between Kichha-Haldwani road in the east and the Dimri on the west except in the matter of road construction in which case it will go up to Gadarpur. Later the Division can comprehend all Tarai and Bhabar areas that may be approved for development and colonization.

The colonization schemes will involve irrigation, engineering, building and roads engineering and public health engineering, exclusive of agricultural engineering. We considered it advisable that an engineering staff should be appointed for dealing with all the branches as far as civil engineering is concerned. Charges recommended are as follows :

Overseers	Two for every 400 houses.
Assistant Engineers ..	One for every six overseers.
Executive Engineer ..	One for every three Assistant engineers.

With regard to electrical and mechanical engineering, we propose that the electrical and mechanical staff appointed for dealing with all electrical and mechanical equipment should also deal with all electrical and mechanical work required within the colony, including the construction of tube-wells, water supply etc.

CHAPTER VI

FINANCIAL IMPLICATIONS

70. Scope of the chapter—In conclusion we may briefly set forth the financial effects of our proposals as far as is possible at this stage and to give a general result of our investigations.

71. Initial capital outlay on 50,000 acres between Bareilly-Haldwani road and the Dimri—To attempt to give anything like an accurate forecast of capital outlay involved in the development of the Tarai area is a difficult task rendered all the more so because of unsettled labour rates and fluctuating prices of machinery, equipment and material. A rough estimate, as accurate as possible under the circumstances, concerning the various spheres of development and arising from the recommendations made by us is given in Appendix XI. These estimates pertain to the area covering some 50,000 acres between the Bareilly-Haldwani road and the Dimri, of which reclamation is contemplated in the first phase of development.

72. Probable capital expenditure on other schemes—We have not recommended settlement operations in other areas without a detailed, topographical, contoured survey as it is not possible to locate villages, roads, tube-wells, drainage channels, farms etc. with precision nor to estimate the consequences of erosion and faulty drainage. But the general principles underlying our recommendations can safely be applied to those areas. In the light of our proposals, and recommendations, we have also framed estimates, for those areas, which, in the nature of things, must be regarded as rough. These estimates are given in Appendix XII.

The statements of costs will give an idea of the expenditure involved. This has been classed as non-repayable and repayable further sub-divided as non-recurring and recurring. The extent of non-repayable commitment may seem large but the cost of land reclamation which involves such major works as clearance of land and construction of roads, drainage works, fencing and State buildings and the provision of irrigation, drinking water, health, transport and administration facilities must be borne by the Government. The return on the outlay will be in the contentment and happiness of the people and in augmenting the food resources of the country by the creation of one of the most important granaries of the Province. Repayable expenditure will be financed from loans. These loans may be given at a nominal interest of, say, three per cent. per annum, recoverable in equated half-yarly or annual instalments spread over a period of 15 or 20 years.

Farming on co-operative lines has been approved for the area. The State Farm and the Collective Farm of 1,000 acres each will be merely demonstrational and experimental, and these alone will be financed by the Government. The costs incurred on these will be recovered from the returns obtained and will ultimately be a source of profit to Government. The co-operative farms will be run by the Co-operative Society of Settlers and will not involve Government in any additional expenditure beyond what may be incurred on supervisory staff in the initial stages. Loans may be needed which may either be granted by the Government or by the Provincial Co-operative Bank. The expenses of maintaining the Motor Tractor Station and the Central Seed Store will be met by the farms by paying for the services.

It will be desirable to establish in the initial stages of development, an authoritarian management under a Director of Colonization. The Administrative and Agriculture staff can later be paid out of the profits of Societies which will take over the entire management of the colony.

73. Irrigation works not to be viewed from productive standpoint— From the views we have already expressed regarding the curtailment of irrigation, it follows that the capital expenditure on irrigation works cannot be judged from the purely "productive" standpoint. Even if irrigation were allowed freely, the return from irrigation works would not stand the test. But if irrigation is to be restricted as a matter of policy for health and anti-malarial purposes, the test cannot be applied at all. These latter considerations are of such fundamental importance to the success of the scheme that the capital cost of irrigation works should be considered as an unproductive but necessary liability. But as already suggested, an annual recovery of interest and depreciation charges may be made, so that the State's contribution may be paid.

The scheme of development and colonization is an ambitious one and is indeed a pioneer and unique experiment in the art of developing land. It is a plan of great importance to the Province, and the financial implications are equally great. We hope that it will not founder on the rock of financial stringency. This scheme can be made a model for future developments which may be required in other parts of the country and this reason alone will justify the expenditure.

Govind Ballabh Pant (*Chairman*).
Hafiz Muhammad Ibrahim.
F. H. Hutchinson (subject to a minute of dissent).
A. C. Banerjea.
C. Maya Das.
T. J. Egan.
V. Viswanathan.
W. T. Hall.
J. W. Russell.
R. H. Saloway.
A. P. Watal.
C. M. Bowder.
D. Kelly.
Zahur-ul-Hasan.
A. N. Jha (subject to a note).
Vinod Chand Sharma.
J. Corbett.
Ganga Datt Mashiyal.
Sarwat Yar Khan.
Chintamani Pant.
R. N. Agarwal.

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C. D. Pande.
Shyam Lal Varma.
Saiyed Ahmad.
Phul Kunwari.
R. S. Chhatari.
Hira Lal Arya.
Badri Datt Pande.
G. S. Chooramani.
Radha Kant, *Member-Secretary.*
March 1, 1947.

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CHAPTER VII—SUMMARY

CHAPTER I

74. **Past abortive efforts.**—In this Chapter the causes of the failure of past efforts to develop and colonise the Tarai areas have been noticed in brief, and the need for a planned programme of development has been stressed.

Post-War planning.

Reference has been made to the more recent planning activities which owe their birth to the establishment of a Post-War Re-construction Board in 1943. A "Preliminary Report on the Scheme of Soldiers' Settlement in Tarai" was prepared by Mr. J. W. Russell but no action was taken thereon because of opposition from Sir William Stampe.

Resettlement of ex-servicemen.

On the cessation of hostilities in 1945, efforts were renewed for the resettlement of ex-servicemen and this led to the appointment of an Officer on Special Duty at the Headquarters of Government to prepare schemes for colonization of ex-servicemen.

75. **Colonization Schemes.**—The Special Officer (Mr. Radha Kant) prepared Colonization schemes for the resettlement of ex-servicemen in the Naini Tal Tarai, Kashipur, Afzalgarh and Lakhimpur-Kheri and Mr. Hutchinson prepared a note entitled " The First Stage of Development of Collective Farms. "

76. **Appointment of Committee.**—These various schemes led to the appointment of this Committee to examine the various problems from the technical and administrative points of view and to prepare a blue-print of all round development of Tarai areas.

77. **Personnel and terms of reference and review of meetings.**—After referring to the personnel of the committee and the special terms of reference, a brief review of the sittings of the general committee and its sub-committees has been given. The details are reproduced in the various appendices.

CHAPTER II

78. **General description of areas.**—General description of the areas is given in the schemes prepared by Mr. Radha Kant, which are reproduced in Appendix II.

79. **Need for a long-range policy of development.**—The problem of Tarai development is of a diverse and complex nature and requires the adoption of a consistent policy of vigorous development. The existing deplorable condition cannot be permitted to continue any longer. The soil is characterised by its rich fertility and excellence and needs but little irrigation. If persistent efforts are made for control of malaria, the tract can be made fit for healthy living.

80. **Erosion and drainage not serious problems for this particular area**.—Apart from the problem of malaria which has been critically examined in the next chapter, the other objections raised by Messrs. Hall and Watal in regard to erosion and drainage (the latter is considered by them as " insuperable except at prohibitive cost ") have been given due weight to but we find that they are unjustified, a finding confirmed by the results of the contoured survey of the area which was recently carried out. Drainage in these parts does not present a formidable problem. The longitudinal slope varies from 16 feet to 1·5 feet per mile, not so steep as to cause any serious erosion. The average slope is 0 2 per cent. Authorities on erosion do not consider slopes of less than 2 per cent. as worthwhile. Moreover, we are assured by the Director of Agriculture that erosion can be prevented by a planned system of strip cropping.

81. **Tempo of colonization**.—In the interest of the health of the settlers we have thought it fit to recommend that the settlers should not be brought in unless houses for their residence are ready, essential roads constructed, drinking water provided, malarial measures started and fencing on the outer belt erected. This work should be undertaken at state expense and by Government labour for whom too *kachcha* malaria-proof houses should be provided. We are of the opinion that the scheme should progress from the centre of Rudrapur towards blocks nos. I and II marked on the map, and the proposed co-operative farming should commence after the State Farm has been established. Subject to the above considerations, development may proceed on the lines suggested by Mr. Radha Kant.

82. **Survey of other areas**.—Settlement operations in Kashipur and other areas should not be attempted until contoured survey has been carried out as in the case of Naini Tal Tarai. The general principles underlying our recommendations will, however, apply *mutatis mutandis* to those areas as well.

83. **Forests and existing rights of cultivators**.—In view of the importance of forests generally we have suggested afforestation in other areas as well. As a result of the importation of settlers from outside, a careful redistribution of existing rights in regard to grass, timber and fuel will be required, and the Forest Department will have to be given ample warning to sell the *Semel* and *Khair* trees which are largely in demand.

84. **Sanwaldeh and Dhela**.—We have recommended that the colonization scheme for Sanwaldeh and Dhela villages should be taken up at once, as it represents no major problems for development.

CHAPTER III

A—Measures to eradicate Malaria

85. **Malaria, the chief problem**.—The hub of the problem is malaria , but the recent developments in science have placed powerful insecticides and drugs within the reach of the malariologists to fight it. The medical experts (including Major General Covell, Director, Imperial Institute of Malaria, Delhi) are unanimous in their finding that,

given necessary financial assistance and a long-term policy, the incidence of malaria can be controlled and the tract made reasonably healthy for settlers. The measures to control malaria have been indicated, and the more important ones are noticed below.

86. **Tube-well irrigation for Canal irrigation**.—In view of the tendency of the canals to cause water-logging and increase moistness and sickness we have strongly recommended the substitution of canal irrigation by tube-well irrigation. Tube-wells are practicable in the area and can ultimately prove economic both to the state and the cultivator.

87. **Sub-soil drainage**.—Natural drainages should be improved and artificial drains should be constructed where water-logging occurs and physical obstructions in the bed and the sides of the streams removed.

88. **Drinking water**.—Wholesome drinking water should be obtained through tube-wells from the strata below the first.

89. **Village sites**.—Care should be exercised in the selection of village sites so as to locate them on high ground possessing good natural drainage, and at least half a mile away from streams, collections of water and forests. They should be centrally situated with regard to farms, be within convenient reach of main roads and should be properly laid out.

90. **Anti-malaria Organization**.—There should be a permanent anti-malaria organization for the Tarai provided with an adequate staff, equipment, and drugs so as to carry out anti-malarial and anti-larval operations incessantly.

B—Best means of Irrigation

91. **Irrigation not a pre-requisite to development**.—Irrigation is not a *sin qua non* of development in this area and should only be provided as an insurance against drought. Tube-well irrigation is recommended as an anti-malaria measure.

92. **Source of power**.—In the absence of hydro-electricity, diesel pumping sets have been recommended for lifting water for irrigation. If diesel engines are not available in sufficient numbers, two or three big oil engines may be installed to generate electricity for electrically driven pumps.

C—Communications

98. **Improvement of means of communications**.—The present rail and road communications are in a deplorable condition and there is urgent need for their improvement in the interest of stable development of the area. We believe that " good roads and prosperity go hand in hand. "

94. **Re-alignment of Railway project**.—The Railway Board intend taking out a line direct from Rudrapur to Lalkuan intercepting a large number of streams, which is likely to cause serious water-logging. Re-alignment along the water-shed to Tanda and beyond to Haldwani is suggested.

D—Best method of Farming

95. Various systems of farming examined.—We have discussed the various systems of farming ; individual, collective, co-operative and State farm. The individual farmer cannot possess the means to effect *any remarkable improvements in the methods of cultivation.*

96. Collective farming not suited to our conditions—In collective farming, ownership vests in the state and all the principal instruments and means of production are pooled as common property. Collective farming implies the highest degree of compulsion and a violent break from the past. *It is wholly foreign to the Indian concept of proprietorship and social relations and must be ruled out of consideration.*

97. State farm incapable of general adoption.—The State farm has a limited sphere of utility, demonstrative and educational, and cannot be recommended for universal application as *it tends to reduce the farm worker to the status of a labourer.*

98. Co operative farm stepping on to Joint farm management advocated.—Co-operative farm connotes a system in which the holdings of individual peasants remain distinct but co-operation is extended to a number of agricultural operations, marketing and processing of the produce and the use of agricultural machinery, aided with co-operative credits, co-operative stores and co operative cottage industries. Co-operative farming is the only answer to the solution of our problems. But we should not restrict our activities to farming alone and should organize our rural economy on the basis of joint farm management, processing our local products and running our own small industries. *Joint farm management is perhaps the most concrete and immediately* practical form in which we can at present express the general ideas of co-operative farming. In the Tarai where we intend settling ex-servicemen accustomed to a corporate and disciplined living, conditions are quite favourable for the adoption of co-operative farm management. We have also suggested the establishment of a state farm and a collective farm of 1 000 acres each for demonstration and experimental purposes.

99. Mr. Maya Das's note on Agricultural Development.—In consonance with the principles that we have enunciated, Mr. Maya Das, Director of Agriculture, has prepared an elaborate note on agricultural development which is reproduced in Appendix IX. While preferring mechanical cultivation, it must in the first instance (owing to limitations of finance and non-availability of machinery) be limited to occasional breaking of land, subsequent cultivation being done with bullocks and bullock-drawn implements. A separate motor tractor station where service will be paid for by the various farms should be located on the State farm.

Provision has been made for research, and an agricultural organization has been suggested on a liberal scale to cope with the difficulties in the initial stages. The capital outlay and investments on the various farms together with returns anticipated are examined at length in the note of Mr. Maya Das.

E—Disposal of land to settlers

100. Land Settlement Co-operative Societies.—In order to encourage co operative farming, crown lands and other lands acquired from zamindars for purposes of development and colonization should be leased out to Land Settlement Co-operative Societies of settlers, which will then allot lands to individual settlers who will enjoy hereditary rights of a special type. In order to prevent alienation and fragmentation of holdings and for the better administration of co-operative societies, we have recommended to Government the desirability of promoting legislation in order to achieve the objects in view.

101. Prevention of accrual of further rights in the land.—We have also advised Government to take steps to prevent further acquisition of rights in the lands under consideration of Government for colonization so as to prevent further complications in the acquisition of land.

F—Acquisition of zamindari land

102. Outright acquisition of proprietary rights.—We have found ourselves unable to agree with the recommendations of the sub-committee to obtain land on 99 years' lease from proprietors for purposes of development and colonization and have recommended outright acquisition of proprietary rights. It is wrong in principle to commit Government to heavy investments on other man's land. Moreover, the large amount of annual lease money that the Land Settlement Societies will be called upon to pay to zamindars may seriously impair their financial resources.

G—Development of settled areas in the Tarai and Bhabar

103. Appointment of sub-committee for examining settled areas.—The problem of developing settled areas in the Tarai and Bhabar is of a kindred nature but in view of the complexities involved in the financial adjustment we have considered it desirable to make our recommendations in a separate report. We have appointed a sub-committee of 12 persons with Mr. C. M. Bowder as Member-Secretary to submit proposals for development within a month.

CHAPTER IV

104. Cattle Breeding and Dairy Farm.—The immediate establishment of a cattle breeding and dairy farm with a herd of 100 cattle has been suggested somewhere near the headquarters of the colony for which purpose 500 acres are proposed to be set apart in the lay-out of the colony. A system of mixed farming has been advocated.

105. Poultry Farming.—The tract is well suited for poultry farming. A start may be made with each individual settler having his own chicken run, the produce of which be sold on a co-operative basis.

106. Fisheries.—Development of fisheries is not very promising as the streams are generally small and run dry during the hot months. Further investigation of prospects in the bigger rivers and other places is necessary.

107. Cottage Industries.—As a large number of the service personnel is trained in cottage industries before demobilization, it will be easier to start cottage industries for which the prospects are very favourable in view of the availability of raw material. They should be run on co-operative basis with Society's own or borrowed capital and State aid for remunerative marketing.

108. Fuel and Timber plantation.—In order to make the colony self-supporting in timber and fuel, forest plantation, not far from the village site, is suggested. Grazing has already been provided for under a system of "Ley farming".

109. Type of fence required.—Having considered the various types of fencing (including a stone wall) to keep off the animals, we have recommended the wove-wire-*cum*-barbed wire fencing as the most economical and effective.

110. New villages.—The new villages should be sited to suit the configuration of the country and their areas should be within 1,000 to 3,000 acres. There should be no interference with the existing residential sites and grazing areas where cultivation is otherwise full.

111. Facilities to settlers.—We have recommended the grant of every reasonable facility to a settler in the initial stages of development including free fencing, use of tractors, drainage, roads, hospital, domestic water supply, etc. and a loan to carry him through for the first six months, until his crops are harvested.

112. Special pay to staff, and rent-free accommodation.—We have recommended the grant of a local allowance of 20 per cent. of the substantial pay to officers and subordinates working in the Tarai in view of the unhealthiness of the tract and arduous nature of duties they will have to perform, and rent-free accommodation.

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CHAPTER V

113. Separate Board of Development for the Tarai.—In view of the need for concentrated efforts we have recommended the establishment of a separate Board of Development for the Tarai with an Administrative side to guide and lay down policy and an Executive side to carry out the actual work. The constitution of the Board has been outlined.

114. Tarai Planning and Construction Division.—The amount of planning to be done and construction work will be great. We have suggested the immediate establishment of a Planning and Construction Division under an Executive Engineer assisted by a complement of Assistant Engineers and Overseers.

CHAPTER VI

115. Financial Implications.—The financial implications of the Naini Tal Tarai scheme have been examined with as much precision as is possible at this stage and the results have been embodied in Appendix XI. Probable capital expenditure on other schemes, estimated in the light of recommendations made for the Naini Tal Tarai area, is given in Appendix XII. We have put in an earnest plea for not viewing the irrigation works or for the matter of that the development schemes as a whole from merely the productive standpoint.

The scheme of development and colonization is an ambitious one and unique in the annals of land development in this Province, and we only hope that the scheme will not be allowed to founder on the rock of financial stringency.

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Minute of dissent by F. H. Hutchinson, Esq., C. I. E., I. S. E., Chief Engineer, Eastern Canals, United Provinces, Public Works Department, Irrigation Branch, on the Report of the Tarai and Bhabar Development Committee.

I. *State Farm*—I do not agree with the recommendation made by the Committee that the State Farm should be opened and controlled by Government for the following reasons :

(i) The State Farm is to occupy 1,000 acres. This means that 100 ex-service families will be deprived of good land. The inevitable result will be friction between the Colonization Officer and the Director of Agriculture and his representatives.

(ii) The estimates forecast that the State Farm will give an annual profit to Government of Rs.81,000. The whole object of the Colonisation Scheme is to benefit ex-servicemen and not Government.

(iii) It is certain that there will not be sufficient implements to satisfy every one. The Colonization Officer will resent the Director of Agriculture using available implements on the State Farm when they might be used for the benefit of ex-servicemen.

(iv) I anticipate great difficulty regarding labour in this area. The Colonization Officer will resent the Director of Agriculture making use of available labour for the State Farm when it might be used for the benefit of ex-servicemen.

II. *Collective Farming*—I do not agree that the Collective Farm should be managed by Government as proposed. The Collective Farm should be managed by the Colonization Officer with the aid of his ex-servicemen under the guidance of the Administration Board. There should be no interference in the management of this farm by the Agriculture Department or any other department.

III. *Cattle Breeding Farm*—The estimates show that this farm will give an annual loss of Rs.10,000. I am not in favour of opening a Cattle Breeding Farm. If one is considered essential in the interest of ex-servicemen, it should be managed by the Colonization Officer and not by Government.

IV. *General*—The difficulties which the Colonization Officer will have to face will be legion. Any competition with Government departments or interference by Government departments will add still further to his difficulties. Whatever is done within the Colonization area should be the control of the Colonization Officer. No portion of the area should be under the separate control of any department of Government.

F. H. HUTCHINSON,
Chief Engineer (E), I. B.

March 2, 1947.

Note recorded by Mr. A. N. Jha, I.C.S., Deputy Secretary to Government, Finance Department, United Provinces

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The approximate expenditure involved in these recommendations is 329 lakhs of rupees non-recurring and 25 lakhs recurring. Before any of the recommendations can be implemented the accurate financial implications must necessarily be worked out and fully scrutinized.

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A short history of the Tarai and Bhabar area Naini Tal district under Development Scheme by Shri Shyamlal Varma, M.L.A., Naini Tal

During the epic age the Bhabar and Tarai area was full of hermitages of famous sages. Drona Charya lived near Drona-Sagar in 'Kashipur' where he taught archery to 'Arjun' and other princes of Hastinapur. Many stupas prove that the place was of interest and importance at the time of Budhist Kings. Sitabani near 'Kota' is said to be the Ashram of Rishi Balmiki where Shree 'Sita' Ji lived in her exile (Banbas) having been extended from 'Ouchpuri' by Shri Ram Chandra. During Mahabharat period this tract was under Vidharba Kings who were renowned for their cattle wealth. The Pandavas also lived here during their one year's secret exile (Agyatbas). 'Kichak' the generalissimo of the Vidharva King was slain bby Bhimsen somewhere south-west of 'Kichha' and Arjun defeated the army of the 'Kauravas' which was forcibly fetching away all the cattle wealth of the 'Vidharvas'. Extensive ruins in this part show that there were populous cities and powerful kingdoms. Huen-Tsang the renowned Chinese traveller visited this place including Rampur-State, Pilibhit and Bijnor then altogether called Matipur and Govishand in 6 A. D. Form his account we gather that these wede well populated and were powerful kingdoms. During the Gupta period the Kingdom of Karikeyapuri (Kumaun) was so powerful that it defied the arms of Gupta Kings. The ancient fort of Kashipur belongs to the Gupta period as the recent excavations prove. Cattle rearing has always been one of the main occupation of the people in this tract from time immemorial other than the cultivation.

In the 13th centrury Nasiruddin and Balban attacked and ravaged this territory and later Feroze Shah followed. For sometime this territory remained under Moghul Emperors. The Kumaonis under Rudra Chanda (1565—97) fought a successful battle for Akbar in Punjab at 'Kangra'. In recognition of this bravery and victory Akbar conferred a grant of 'Chaurasi-Mal' (this area) as then called, on this ruler Rudra Chanda The Ain-i-Akbari gives the following account of the territory :

The entire Sarkar contained 21 Mahals assessed at 4,04,37,700 dams [which are equivalent to Rs. 20,21,885 (Re. 1=20 double dams)]. Five Mahals yielded no revenue and the entire Sarkar was supposed to furnish a quota of 3,000 cavalry and 50,000 infantry. The area between 'Sarda' River in the east and Pitandi in the west within Chaurasi-Mal was called Naulakha-Mal probably because 9 lacs were assessed on it. It contained the following divisions :

(1) Shahajgarh-Jaspur, (2) Kota-Kashipur, (3) Mundiya-Bazpur, (4) Gadarpur, (5) Bhuksar, (6) Bhakshi-Nanakwatta, (7) Chhinki. The Chand Rajas made their best efforts to develop this area and three towns Rudrapur, Bazpur and Kashipur, the main Mandi of cloth for Kumanu founded by Rundra Chand, Bazbahadur Chand and Kashinath Adhikari respectively. From Batten's settlement (Bandobast) record also it can be seen that this area was much more populous and well cultivated. Si

Henry Ramsay also did his best to develop this area by improving the system of canals, and encouraging the people to settle here by giving every possible help from the State required for settling. In 1891, 88,000 acres of land was under cultivation in Bhabar and 140,000 acres of land in Tarai. The cultivated area in Bhabar has been reduced to practically one-third of the area in 1887 and in Tarai the cultivated area decreased by about 30 per cent. and the population in Bhabar and Tarai within 50 years have at least decreased by 25 per cent. and 33 per cent. respectively whereas against this the population of the country has increased by not less than 35 per cent. within the same time. Both these areas did not recover after the Epidemic disease of 1918.

From the above account there can be no denying the fact that the areas have seen many ups and downs. In spite of its adverse climatic conditions people have lived there from pre-historic times. The fertility of the area always allured people to settle over there and it has seen glorious times by way of flourishing population and powerful kingdoms being established there.

Now with the full advantage of modern sciences, medical and agricultural and modern means of conveyances and power implements for cultivation purposes it will prove sheer pessimism and defeatism on the part of those who dare to oppose the development of the area. I think this area is the best land, best fitted and conducive of best results for effecting the Grow-More-Food Campaign of the Central Government.

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APPENDICES

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APPENDIX I

Mr. J. W. Russell's "Preliminary Report on the Scheme of Soldiers' Settlement"

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Preliminary Report on the Scheme of Soldiers' Settlement on the Tarai and Bhabar Government Estates, Naini Tal

By J. W. Russell. Esq., I.S.E.

Though this is only a preliminary survey of the scheme, I have tried in this report to review all its various possibilities and problems; & to make suggestions and proposals which may form the basis or prove useful in drawing up the final plan and details. The various aspects will have to be worked out in greater detail in due course. Dr. Das, Assistant Director of Public Health, United Provinces, has looked into prospects from the health point of view and Mr. Naqvi, Director of Agriculture, Rampur State, has investigated the Agricultural aspects. Both the officers are submitting separate reports which may be considered in conjuncton with mine. What follows applies particularly to the Tarai and Bhabar Government Estates, with which I am directly concerned; but I have mentioned the adjoining areas of Rampur State which are concerned with the scheme to such extent as circumstances permit.

I—Outline of the scheme

The main outline of the scheme which has been tentatively accepted is to establish a large compact area of about 50,000 acres of cultivation with one central town. The two parts of the scheme, town and country, are to be complementary, i.e. serving and served by one another. In addition to industries dealing with farm produce there should be other manufactures to utilize local forest produce. The town will provide marketing and purchasing facilities of all kinds to suit the local needs. All administrative, social, public health, education and other welfare and public services wil be centred in the town. Cultivation of the land will be done from village settlements situated within reasonable distance of the town, i.e. five miles approximately.

II—Choice of Area

An area of 50,000 acres is represented roughly by a circle of five miles radius. Such areas in compact blocks are hard to find even in Tarai and Bhabar Government Estates, where so much land has gone out of cultivation. The possibility of including adjoining areas outside the Estates has, therefore, had to be considered. In the Bhabar a total of barely 7,000 acres of culturable land is uncultivated and that too is made up of small areas in numerous different places. This rules out the Bhabar. Much larger areas are however available in the Tarai.

The Tarai portion of the Government Estates falls within six parganas two in each of three Tarai tahsils. The Eastern tahsil is at Khatema, and its two parganas are Dilheri and Nanakmatta. This tahsil is populated chiefly by Tharus, a local tribe or caste who have developed a large degree of immunity from malaria. In consequence, both population and cultivation are more or less stable. Only small areas, mostly bordering the neighbouring district of Pilibhit and which were tenanted by other castes have deteriorated. The total area which could be made available for new settlement would be about 5,000 acres only, but scattered, so will not be suitable for the scheme. This tahsil is practically a Tharu preserve and should be left as such.

The middle tahsil is at Kichha and is comprised of the parganas Kilpuri and Rudarpur. The upper half of the pargana Kilpuri north of Sittarganj is also populated entirely by Tharus. The portion below Sittarganj has a mixed Mohammadan and Hindu population which has gradually reduced, and still continues to dwindle. Thus considerable areas of once cultivated land are lying uncultivated and are available for new settlers. But during the past few years the Tharus have at last been driven to leave their villages north of Sittarganj owing to widespread havoc and loss caused by wild elephants, and a large number have settled in the southern area. When, as I hope after the war, the wild elephants are rounded up, these Tharus will certainly move back to their old villages, so that the whole southern block will then be available for allotment to others. This tract suffers from the great disadvantage that it is rather cut off owing to bad communications. Complications also arise as it includes a number of zamindari and Mustajari villages with proprietary and other rights. But ultimately when and if these objections have been removed one fairly compact block of about 15,000 acres only could probably be arranged here. The large block of protected forest lying between Sittarganj and Kichha contains *sal* and other valuable timber trees so it is not advisable to disforest this to make a larger area available for colonization here. In consequence of all these considerations a suitably large area will not be available here.

Pargana Rudarpur comprises the area around Kichha and Rudarpur. Most of the existing cultivation lies around Kichha where in addition to the ordinary tenant class there are a number of big farmers holding large blocks of land on lease. There is in consequence not very much land available for colonization purposes here. But the population grows sparse towards Rudarpur and large areas of once cultivated land have lapsed to grass.

Out of a total area of nearly 19,000 acres of village land within five miles of Rudarpur only 2,500 acres are now under cultivation. In addition it will be possible to take another 20,000 acres of good culturable land from the Estates forests lying adjacent on the north, while over 30,000 acres of once cultivated land are also lying idle in the Rampur State immediately bordering our vacant areas. Furthermore this block links up with the comparatively well cultivated block surrounding Kichha on the one hand and the cultivated portion of Bilaspur Tahsil in Rampur State on the south so that together they would form a good solid block about 13 miles long and at least 10 miles deep. The recent metalled road from Kichha to Rudarpur and from there on to Rampur runs through this block of land, while two other main roads, though *kachcha* radiate from Rudarpur. We thus have both the land and a frame work of communication here, which is not obtainable elsewhere in the Estates. Except for a few BUXAS west of Rudarpur the tenants belong to Mohammadan and Hindu castes ; the former being in a majority of about 2 to 1. The total number of tenants now left in the Estate within five miles of Rudarpur is only about 270.

The third tahsil is Bazpur, with its two parganas Gadarpur and Bazpur. Large areas of once cultivated land are lying waste in thedarpur pargana. The total of such area including culturable forest land may be about 30,000 acres in the Government Estates alone, while a considerable area of similar land lies in the Rampur State bordering ours on the south This pargana, however, suffers from certain disadvantages. It is by far the most unhealthy and malarious part of the Estates, it is badly situated and served by only *kachcha* roads, and it is now largely tenanted by BUXAS. The problem of the BUXAS is concerned with their extravagant and wasteful use of land and water. The BUXAS requires three or four times as much land as others, because he only cultivates a plot for two or three years and then leaves it fallow till it recouperates. He is unsettle and shifts from one village to another every few years. He does not know the use of manure. He cannot cultivate without a lavish supply of water, which he uses wastefully, water-logging the country and rendering it unfit for habitation by any but his own tribe, who like the THARUS of the eastern part of the Estates are more or less immune from malaria. Before the Gadarpur pargana can be used for colonization the BUXA problem will have to be solved. The only solution I can think of is to remove them from any area selected for colonization and restrict them to a belt of country in the nothern parts of the tahsil. Bordering land in the Rampur State is also swampy and broken up, and the State authorities do not consider it as favourable for settlement. However it may be possible to get enough land to make up another block of about 50,000 acres here and this may be kept in view for future development.

The Bazpur Pargana contains in its southern half some of the best and most intensely cultivated land in the Estates. The bordering land of the Rampur State are also well cultivated and populated. This area has not suffered as much deterioration as elsewhere. The tenants of this part are mostly Mohammadans. About 9,000 acres of land is available for settlement in the northern portion of the pargana. This again is tenanted by BUXAS, which explains why the land is vacant. It appears to me that this might be retained as a BUXA preserve and the BUXAS of Gadarpur Pargana shifted there, if that area is taken up for colonization later.

The area around Rudarpur meets the requirements of the scheme so very admirably that it is the obvious choice, and I recommend its acceptance. It suffers from the drawback that it is not on a railway. But motor transport is sure to expand enormously after the war, and with the *pucca* road connecting with the railway at Kichha only 8 miles distant, this disadvantage should not be considered a serious one.

III—Delineation of boundaries of the chosen block

The block I have chosen in the Estates extends from the Rampur State boundary to 5 miles north of the Kichha-Rudarpur Road connected to the cultivated areas of the Kichha on the east and as far as the Dhimri Nadi on the west. The northern boundary is a straight line except for a small block which I have added at the north-east corner in order to take advantage of the Bareilly-Kathgodam Road. Map no. 1 shows the present cultivated, uncultvated and forest areas in this locality in the Estates. The area shown as forest is that lying within the demarcated boundary of the Estates forest, but it actually consists mainly of grass land, with belts and small blocks of forest trees covering hardly a quarter of the total area. The Rampur State wishes the new settlement to extend from the present cultivated areas near Bilaspur to their northern boundary, as far as the State boundary in the east, and the Dhimri Nadi on the west. This fits in with our proposals, though the block protrudes to the south. In view of this and also because of the two different Governments concerned, the State's area may be centred on Bilaspur, while Rudarpur may be accepted for the town in our block.

IV—Description of the country and its condition

It would not be out of place here to give a very brief description of the country embraced in this block. That portion which lies in the Government States falls almost entirely in the tarai belt, while the adjoining land of the Rampur State may be termed ' semi-tarai', i.e. lying between the tarai and the open plains of the province. The tarai as its name implies is wet land. It is characterized by numerous spring fed streams which traverse its width running roughly from north to south. These springs are the seepage, outcrops from the hills and the porous Bhabar land along the foot hills. Along the northern edge of the tarai the sub-soil water table approaches very near the surface of the ground and bursts through in the form of spring in the troughs or valleys of the land undulations. In their head reaches these spring-fed streams are small and shallow, but they increase and grow deeper down their course, and also combine to form fewer but larger and deeper streams. Thus the tarai can be sub-divided into two belts, the upper and the lower tarai, the former being that in which the streams actually have their course. The sub-soil water table is nearest the ground and the wet conditions most pronounced in the upper tarai where the numerours small streams occur. Conditions gradually improve as we move down from the upper edge ; and so we find that the spring level in the lower tarai though high is lower than in the upper portion, while the ground surface is well drained owing to the excellent cross-slopes. But the whole area is comparatively damp, malaria ridden and unhealthy. The tarai is sufficiently notorious to need no further stress on this. Portions of the lower tarai are, or have been, cultivated ; whereas the upper has generally not been. Still lower down the conditions in the semi-tarai are slightly better and most of it has been cultivated. Thus we find on the basis of actual experience, that the lower tarai and semi-tarai belts are culturable. Parts of the upper tarai also may be culturable, but I have not considered it advisable to include them in the scheme, because conditions are less favourable and success largely depends on the concentration of measures on a large compact block. The area selected has been confined to lower tarai and semi-tarai lands.

Except for portions now under cultivation the tarai lands are composed of vast expanses of grass lands fringed by strips of inferior forest usually bordering the streams. The only use made of these vast grass areas is as grazing grounds for cattle, which number many thousands.

Wild beasts abound, many species of deer, wild boar, tiger, panther and even wild elephant. Actual forest probably covers only ¼ or 1/5 the area, and consists as far as I have been able to judge of practically valueless trees except for *semal*.

Life in most of our tarai villages is one of continual struggle for existence, against the depredations of wild animals, the rank and vigorous tarai vegetation, the enervating climate, malaria, bad drinking water, high death rate and infant mortality, low birth rate, bad communications and lack of ordinary amenities. Partial and temporary success in settlement has been achieved in the past mainly as a result of the effort, resource and influence of particular indviduals, only to give way under heavy odds to deterioration again. The influenza epidemic of 1918 caused great depopulation in some parts, while a series of dacoities (to which the villages are prone owing to proximity of sheltering forests) over a period of years caused many to take flight. But conditions are so precarious that even minor calamities set deterioration in motion. Thus there has been a steady decline in population and cultivation during the past 20 or 30 years.

I mention these facts not with the object of discouraging the scheme of soldiers' settlement but to stress the necessity to overcome these troubles, as otherwise it would sooner or later end in failure. Personally I am very hopeful. The country itself is most attractive, and could be transformed into a beautiful settlement. But to achieve this it is essential to substitute co-operative efforts for the isolated individual effort of the past ; and to adopt and continue to employ effective measures to remove or reduce the many hardships, difficulties and disadvantages which have to be contended with. I will therefore deal with these next.

V—Various aspects of the scheme and their problems

(*a*) *Public Health*—Enough has been said to show that the maintenance of the public health is the most essential part of the scheme. The scheme succeeds or fails according to the measure of control of malaria in par ticular and the maintenance of robust health generally. But general sanitation in the town and villages will also have to be looked after and a general hospital provided in the town for the treatment of serious cases of illness.

With regard to anti-malarial measures, Dr. Dass, Assistant Director of Public Health, United Provinces, has carried out his investigation and is submitting a separate report with his recommendations. I will therefore confine myself to giving my own personal opinion and the steps I suggest for dealing with this most essential part of the scheme. Failure to control malaira would doom the scheme to almost certain failure.

(1) The wholesale clearance of forest within the chosen boundaries in order to bring the whole of the land into one immense open and compact block of cultivation, will help to clear the atmosphere and reduce humidity. Furthermore the cultivation of all the land will keep the area clear of tall grass and so remove harbouring places for mosquitoes.

(2) All forest should be cleared for 2 furlongs beyond the northern boundary of the block; but a continuous belt of forest about half a mile wide should be provided beyond that to act as a "mosquito screen". The intervening space, 2 furlongs wide, between the screen and the northern boundary may be planted with eucalyptus trees. *Chir* pine could also be tried in this strip as it would make the atmosphere healthier and is specially useful because it smothers vegetation below it.

(3) Dry farming is strongly advoacated here as an anti-malarial measure. I am convinced that a great deal of the malaria trouble is man-made, through excessive irrigation and waste of water. I have ascertained from ten years' experience in the tarai and semi-tarai that excellent *rabi* crops can be and are actually raised here without irrigation. Sugarcane which will be one of the important crops on the farms can also be grown without irrigation. Dry *kharif* crops should be encouraged and rice cultivation reduced to a minimum. In an exceptionally abnormal dry season recourse to irrigation may be necessary to save the crops. This should be provided through tube-well rather than canals.

(4) The perennial streams should be improved somewhat by straightening them out as far as possible. Only the most tortuous reaches need be attended to. Slopes are good so the straightening done will admit of deepening the upper reaches of the streams thus improving sub-soil drainage. Surface slopes are on the whole excellent, so the need for surface drains will hardly arise. If a few are found necessary no difficulty is anticipated in making them, because of steep country slope.

(5) As the country is singularly free from swamps the main breeding places for mosquitoes must be the perennial streams and canals. Suitable anti-malarial measures, such as spraying Paris green or oil, must be undertaken along these.

(6) One of the simplest and cheapest means of attacking malaria seems to me to be the introduction of "gambusia" fish into the streams in large numbers. We should maintain our own hatcheries and pour the fish into the streams in thousands. These hatcheries should be

a permanent feature of the anti-malaria scheme as the streams will have to be replenished with these fish from time to time.

(7) All road side ditches must be effectively drained.

(8) The tenants must be made to avoid the formation of small puddles around wells, houses, etc., to attend to their room and house drainage, and prevent stagnant pools forming anywhere from any cause.

(9) All tenants must be properly housed in *pucca* houses made mosquito proof with strong wire netting.

(10) All dwelling houses to be regularly "flitted" with anti-mosquito insecticide. In the worst seasons this should be done twice a week and at other often according to requirements.

(11) A concentrated and determined anti-mosquito drive should be carried out once a year at that season when mosquitoes are least numerous and breeding slack. The underlying idea is to exterminate them when their numbers are few and there is in consequence the best chance of making decided impression.

(12) All tenants to undergo a prophylactic course of treatment once a year when the incidence of malaria is lowest. Here again the idea is to kill the parasite in the blood when the infection is low. I believe this will be better than administering quinine for prolonged periods.

(13) Proper medical attention to be provided. A central hospital is necessary ; and travelling compounders must make regular visits to all villages to treat mild cases.

(14) Use of mosquito nets by all.

(*b*) *Agricultural.*—Mr. Naqvi, Director of Agriculture, Rampur State, has looked into the Agricultural aspects of the scheme and has submitted a separate report. Excellent crops are grown on the present cultivated lands and can be expected from the whole of the proposed area. The principal *rabi* crops suitable for the area are wheat, gram, barley, *masur*, mustard and linseed. Rice is the most popular crop here, but I consider it desirable to reduce rice cultivation to a minimum and encourage other *kharif* crops (such as maize) which do not require irrigation instead. Maize is extensively grown in some parts of these Estates, and as surface of the land in the chosen area is generally well drained, it should be particularly suitable for maize cultivation. Sugarcane does exceedinly well, and the soil is fertile enough for one or two ratoons. This will undoubtedly be the principle crop or this area.

(*c*) *Irrigation.*—Irrigation should be restricted for anti-malarial reasons. I make this recommendation because it is my firm belief that excellent crops can be (and are actually) grown without it in most of this tract of country. In normal years the rainfall is sufficient to meet crop requirements. The normal rainfall is about 50" and winter rains occur almost without fail in December and January. The soil and sub-soil conditions are such that with this rainfall moisture is retained close to the surface even in the dry months of the year. I have seen first class crops of wheat, gram and other *rabi* grains and also sugarcane, raised entirely without irrigation. These were not the exceptions but the rule. Rice presents a problem. Though I advocate restricting its cultivation some portions are composed of heavy soils partecularly suited to rice. If early maturing varieties are grown, the usually prolonged and heavy monsoon rainfall should prove adequate for them.

Nevertheless. I admit that we have got to be prepared for abnormal seasons when irrigation may be essential to save the crops from failure due to droughts. Probably these periods would occur more frequently in the semi-tarai belts. The perennial supplies available inour streams can be supplemented by pumping from tube-wells. I strongly advocate the use of tube-wells for irrigation (when necessary) in the northern parts of the block, not only because the supplies in the streams are small, and while proving inadequate for the needs of whole of that tract, will, if tapped, there, reduce, supplies available for the areas lower down ; but because whereas canal irrigation often results in water logging, pumping from the sub-soil will counteract it. Furthermore the sub-soil source of supply is so close to the surface (this tarai belt actually yield artesian supplies, evidence of which is to be found in the many artesian wells already in existence) that pumping would be both easy and cheap. For source of power we could utilize either small diesel engines or electricity, if that is provided as part of the industrial portion of the scheme.

The cultivated areas both in the Government Estates and Rampur State are already served by a number of separate small canal systems which tap the supplies available in the streams. These only serve the village lands below the boundary of the forest block to the north. The forest lands included in the scheme will therefore in any case have to depend on other means of irrigation. Thus we would probably utilize sources of supply to best advantage by having tube-well irrigation in the north and canal irrigation supplemented where necessary by tube-wells in the south.

The existing canals are not all scientifically aligned and constructed. Most of them are probably the same canals built by the original settlers in fast ages, who depended only on their intuition and knowledge of the country in aligning and constructing them. Masonry dams and regulators have since replaced the earthen bunds, which were originally depended on to divert supplies from the streams into the canals, But the old method obviously admitted of no regulation, so that canals often developed into drainage streams. Thus a detailed survey will probably show that some modification of the canals system may be desirable, in order to confine them to their proper function. The functions of drains and canals cannot be combined without disastrous results.

(*d*) *Drainage.*—Surface drainage requires practically no attention generally. With a longitudinal slope of about 10′ a mile in the northern tract reducing to about 6′ per mile towards the southern end, and correspondingly higher transverse slopes the country is already well drained. The exceedingly few local depressions can be dealt with without particular difficulty. The very high longitudinal slopes further make it possible to deepen the streams, if needed, by straightening them. I do not, however, think this will be necessary to any great extent, but a small degree of canalization and regrading would improve sub-soil drainage and make anti-malaria control easier.

There are a very few water-logged areas, usually of no great size bordering some of the streams. Underground sub-soil drains, with some filling and levelling of the ground will remedy this. The drainage problems are therefore comparatively small and simple.

(*e*) *Drinking water*—The water of the tarai has always been considered bad, and this is really so if the water is obtained from open wells which tap the top levels of the sub-soil water table. This water is usually contaminated by rotted vegetation, is bad to the taste, dirty in appearnce and harmful to health. Small tube-wells sunk sufficiently deep, overcome these undesirable characteristics by drawing on a lower and purer source of supply. There are many hundreds of tube-wells now installed in our villages, all giving a satisfactory water supply. In the past few years a further step forward has been made by the construction of deep borings. These go 150′ to 300′ below the surface. Most of them yield an artesian supply, but even if any do not the supply is easily raised by hand pump. These borings yield a beautifully clear supply of water. The problem of a good supply of drinking water, therefore, no longer presents any difficulties. Each of our settlements must be provided with a deep bore well, and as the area chosen for the scheme lies in the artesian belt, I believe the majority of the boring may yield an artesian supply.

There is one serious drawback to these continuous flowing wells. They may invariably result in puddle of stagnant or slow flowing water. These must be prevented. So far our artesian wells have not been provided with strainers so they have to be kept flowing for fear of their getting chocked if the flow is stopped. If strainers are provided the wells could be provided with stop cocks, so that the supply could be stopped when not required, without fear of the wells getting chocked.

(*f*) *Protection from wild animals*—Even after clearing the whole block of land and bringing it under cultivation, protection from wild animals will still be necessary. But it should not be necessary to protect each farm. Only the north boundary and the two flanks will be exposed and it would suffice to effectively fence these. The total length of fencing necessary will be about 30 miles only, as compared with 200 miles if each farm were fenced.

Here in the Estate woven G. I. wire fencing supported on R. C. posts is now widely adopted and has proved successful. A masonry wall would be better and more effective but will cost four or five times as much. Both because it is cheaper and because great quantities of surplus barbed wire will probably be available from the Army after the war, wire fencing may be adopted. It can be made up to approved design here. Some device will have to be thought out for preventing animals coming in where streams are crossed. Iron gratings which can be lifted in flood or would swing-open on a hinge automatically by water pressure, would serve the purpose.

This fencing may be supplemented by planting suitable hedges outside it. Probably the most effective would be one of the varieties of cactus. I am not in favour of bamboo as it would attract wild elephants.

(*g*) *Communication.*—Adequate and good communications must form an important part of the scheme. Good roads and prosperity go hand in hand. Good roads not only lead to development, but the extent and the state of communications reflect the degree of economic improvement of a country. It is important, therefore, that at the outset, the scheme is not handicapped by the lack of good communications. We are lucky to have already two good metalled roads. These will serve about half the area. The other half is grouped about two other existing main roads, i.e. the Rudrapur-Gadarpur Road and the Rudrapur-Haldwani Road, but both these are unmetalled. I propose that 5 miles of each of these two roads radiating from Rudrapur should also be metalled at the outset. The scheme will then have its four arterial roads metalled. Gadarpur Road should later be metalled all the way to Bazpur.

Eight or ten branch roads will be required to connect up the farms and villages with the main roads. These will vary in length from 3 to 4 miles according to the positions of the village to be served. These roads need not be metalled but should be scientifically aligned and made to the standard width of our district roads, so that they will be ready for metalling if ever required. Personally I think the solution of the problem of providing good but cheap country roads lies in soil stabilization, which simply means correctly proportioning the sand, silt and clay quantity of which the road is to be made so that there may be no reaches of loose sand or dust, and no reaches of sticky clay which forms slush. We could in time further improve them by providing shingle in the tracks. I hope our farms will have modern transport equipment including pneumatic wheels and ball bearing axles, and with these I am confident the type of road I have advocated will prove entirely satisfactory, though cheap.

(*h*) *Housing*—Another very important part of this scheme should be the provision of good housing for all the tenants. One has only to look at the condition of our existing villages to realize the necessity for this. The present thatched mud huts are nothing, but hovels, dirty and unhealthy, ideal shelters for mosquitoes and a constant source of danger from fire. Our colonists must be saved from these disgraceful and pitiable conditions. What I have in mind are rows of apartment house in each village set out neatly and uniformly with suitable roads between each two rows. The houses must have *pucca* walls and a fireproof roof. I am at present experimenting with types of simple concrete roofs and am confident that a cheap and efficient permanent roof to suit these apartment houses can be constructed. Each apartment will consist of two fair sized rooms with front verandah and a suitable separate cooking place. A small front yard and a larger back yard will also be provided. I also strongly recommend that the houses be made mosquito proof by enclosing the verndah with G. I. wire gauze, and providing gauze doors and windows at the back of the house. The degree of mosquito control it would achieve, would be worth the expenditure on this.

(*i*) *Industries.*—I am not competent to report authoritatively on these, so confine my remarks to indicating those which appear to deserve investigation to determine their possibilities and prospects. Obviously the first to be considered are those which will consume our farm produce. These are of sugar mill, a flour mill, rice mill, an oil mill, and a starch factory. Next would come those which would utilize the produce of adjoining forest lands, such as saw mills, a plywood factory, a match factory, paper mills, card-board mills, fibre board making (to utilize sugarcane bigasse), making of packing cases, a plastic industry, "rayon factory," etc. Hides are collected in large numbers within the Estates and *babool* trees (bark of which is used for tanning) grow here, so leather tanning with allied manufactures could be established. The possibility of starting rubber plantations in our adjoining forests is under investigation at present, so a rubber factory should also be kept in view. A shellac factory would be possible if lac could be introduced to our forest trees which I think may be feasible.

Apart from these, the possibilities for other industries should also be investigated such as chemicals, glass, pottery. These will depend on availability of raw materials and local conveniences, if any. I think this list is sufficient to start with.

(*j*) *Labour problem*—One of the major problems of this area is labour. The population is very small and difficulty is felt in harvesting crops, especially sugarcane. At present labour has to be hired from outside the Estates to cut and cart sugarcane. The difficulty is felt mainly by the large farmers and specially those using tractors for farming. The existence of a central town as proposed will ease the difficulty to some extent, as towns usually provided some casual labour. But it would be wise to keep in mind the possibility of labour shortage. This will only be felt at the time of harvest and chiefly for cutting sugarcane, and it would be well to introduce more efficient methods of harvesting, if possible.

Sufficient numbers of soldiers should also be drafted at the outset into the following trades and occupations to meet the need of both town and country : carpenters, blacksmiths, mechanics, fitters, sanitary inspector, sweepers, etc.

VI—Economic Aspects

To establish a sufficiently high standard of living must be the chief aim of the scheme. In other words the productive capacity of the individual must be higher than usual, the higher the better in my opinion. If a 100 acres of land are devided amongst 20 persons, they may just produce enough to barely list, but will have litttle or nothing to spend. If on the other hand, it is divided among 5 persons they will have a large surplus to spend, which means to exchange for other goods and amenities, which in turn means to enjoy a high standard of living. One is often asked what is to happen to the surplus people of the size of holding is increased. The answer is to absorb them into producing the goods which will be needed for a higher standard of living. In the above-mentioned example, if the dispossessed 15 persons produced the goods and other requirements for the whole 20, they would all be enriched to that extent. Production is wealth, the more production per head the wealthier the people. Money is only the means of exchange of one production for others.

Luckily in our case there is no question of dispossessing any one of land. We start with a very decided advantage. We can introduce the numbers and institute up to date methods to start a wide variety of production from the very start. But we will still not be able to make our colony self-sufficient. Many of their needs will not be manufactured or produced here. There must, therefore, be an exportable surplus from this area, for exchange for goods required here but manufactured in other areas, more suited to that particular purpose.

The whole thing hinges on the productive capacity of the cultitivator. The more he produces above his own needs, the larger the exportable surplus and the richer he is ; the more also will be his demand for other goods. This sets the wheel in motion—more people employed in manufacture, more people employed in transporting goods from manufacturer to purchaser, more shopkeepers and so on. In fact greater prosperity.

There is only one way which this can be achieved and that is by introducing mechanical farming. There is a limit to what a bullock-plough can produce, however, hard it works and that limit is far too low to ensure a high standard of living. A single tractor unit can keep 12 ploughs fully empolyed in cultivating 500 acres or more. That means 40 to 50 acres per plough. This may be too high a figure to aim at perhaps at the start, but I would not consider anything less than 20 acres per plough as worth introducing this scheme for. In a supplement to this report I have shown that on 20 acres the income per plough can be about Rs.1,200 per annum or Rs.100 per month. This is no mean figure. In addition by allotting 20 acres per plough instead of a possible 40 or 50 acres, the tenant will have sufficient spare time to devote to private enterprise. He may grow vegetables, keep a small poultry run, or a small dairy, or have some home industry, in any of which ways he can easily earn another Rs. 10 or Rs.15 per month if not more. I, therefore, strongly recommend the acceptance of collective farming with the aid of tractors at proposed.

Another proposal I wish to make to increase the prosperity of our settlers, is that they are made shareholders of all the local indus tries.

At least 60 per cent. of the shares should be reserved for settlers whether they be industrial workers or farm tenant, but a limit to the number of shares which may be held by any one person should be fixed so that profits may be shared as widely as possible. In this way not only will the settlers be personally interested in the industries, but these will be a source of further income to them. I have proposed the percentage of 60 per cent. because it is desirable to have a preponderance of local interest in their own local industries. It must be realized however, that at the beginning the settlers may not have sufficient money for investment to buy up all the shares. Government would have to step in and purchase the balance and hold these for allotment to settlers on demand later. It will have to be stipulated that any one leaving the settlement must surrender his shares to Government for re-allotment to new or other old settlers.

Co-operative principles should be adopted to as great an extent as possible. Co-operative credits, co-operative marketing, co-operative stores and co-operative home industries are some of the main activities to be introduced. But I would also like to see a system introduced into our big industries whereby the workers and suppliers of the raw material would share in the profits. It could be introduced by stipulating that any profits in excess of a certain fixed minimum would be shared equally between shareholders, suppliers and workers.

VII—Proposed plan and requirements

An ideal arrangement of the whole settlement would be as shown in the following plan :

The town is in the centre where the two main arterial roads cross. Around it are the farm units in squares of equal size. Every four squares has one village situated in the centre at the common corner of the four squares. Secondary roads connecting the villages to one of the main arterial roads will run through each line of villages. In order to obviate the need for culverts and bridges to as large extent as possible these roads should be situated between streams and run in the same direction as the streams. The arterial roads should be good metalled roads ; the secondary roads may be earth roads, at least at the beginning but could be improved by stabilizing the soil and adding shingle in the tracks.

Obviously the configuration of the country and its topographical features will influence the actual plan, and it will not be possible to follow this ideal and uniform layout strictly in practice. But it serves and has been used by me as a pattern for the plan and layout of the colony. The proposals are shown in the map no. 2. I have included that part of the area which lies within Rampur State territory, but the State may desire to have its own independent roads to serve its own villages. The proposed plan will also be subject to modification after a detailed survey plan at the whole area has been prepared but I believe it can be adopted and will only require minor alterations, as far as the Estates are concerned.

The ideal agricultural farm units would be rectangles of sufficient size usually containing from 500 to 1,000 acres. A little more than this will be required to allow for roads, villages, etc. The rectangle would be divided into parallel strips extending from side. Each strip will be worked on the same rotation of crops in turn, which means that the block system will be adopted instead of scattered plots. For convenience of tractor work each strip will be sub-divided into 20 acre plots. This represents two days' outturn of ploughing and one day of harrowing by a 40—60 H. P., tractor unit. The strip will be separated by cart roads and 20-acre plots in each strip by foot-paths. The plan of the farms will thus be as shown below :

Here again the ideal will have to be modified to suit the configuration of the country at each site. Some of the farms may be long and narrow, others short and wide, and some fairly uniform. The dimensions of strips and plots will have to be modified to suit each case, but it is important that the number of strips be kept a multiple of the number of year's rotation adopted, and the plots be 20 acres each. Five have been chosen as the number of strips in the above plan as I have chosen a five-year rotation, in order to accommodate two crops of sugarcane, one from sowing and one from ratoon. It might be thought that the question of crop rotation might well be left to a later date but it will readily be realized that the layout depends on the number of years' rotation adopted if cultivation is to be done in separate strips on the block system which is so very desirable. If rotation is altered the layout of roads will have to be altered to make the number of strips equal the number of year's rotation adopted.

The following table shows how the rotation will be applied :

Strips or plots	1st year		2nd year		3rd year		4th year		5th year	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1	Fallow	Wheat	Rice and other *kharif* crop.	Gram	Green manure.	Preparation.	Sugar-cane.	Sugar-cane.	Sugar ratoon.	Sugar ratoon.
2	Rice and other *kharif* crop.	Gram	Green manure.	Preparation.	Sugar-cane.	Sugar-cane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat
3	Green manure.	Preparation.	Sugar-cane.	Sugar ratoon.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice and other *kharif* crops.	Gram
4	Sugar-cane.	Sugar-cane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice and other *kharif* crops.	Gram	Green manure.	Preparation.
5	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice and other *kharif* crops.	Gram	Green manure.	Preparation.	Sugar-cane.	Sugar-cane.

There is of course no intention of restricting the forms to the particular crops mentioned above. They have merely been chosen as suitable for this example of systematic rotation. It is possible that a single rotation will not suit the whole farm. Two or more rotations can, however, be adopted with slight modifications of the layout.

It is also essential that the strips should run across the general direction of water sheds and valleys, so that all may include similar ground, thus making it possible to adopt the same crops in each strip in turn.

Some of the units may concentrate on dairy produce. These dairy farms will require a modified plan to meet their special needs.

I have not yet gone into details of the layout of the village settlements. Here again only a general type can be suggested, which will have to be suitably modified to suit each individual side chosen. I realize that several satisfactory plans can be evolved, but I am in favour of a simple straightforward layout such as the following. This is based on the assumption that the village will be as the common corner of four farms. Each tenant will be allotted a plot of 30′×90′ which will suffice for dwelling house with suitable front and back yards. A few shops will be provided for around the centre, and playing fields, fruit groves, and vegetable gardens, on the surroundings of the village.

As regards the town plan, this had better be left to an expert. There is good high well drained land around the inter-section of the two main roads and I suggest that the residential part of the town be situated here. The industrial part may be kept along side this, but outside the main town, on the Kichha Road. Provision must be made for a main shopping centre, a hospital school and training centres, club and library amusements and other social and public amenities. We have to see that the town is built to an approved and satisfactory plan with proper streets, drainage, etc. and not allowed to grow in a haphazard manner as so many Indian towns have done and will continue to expand for want of proper town planning and building schemes.

VIII—Management

(*i*) *Farm operation and management*—Collective-farming by a combination of tractor operated implements and bullock-ploughs is advocated. The heavy ploughing and harrowing should be done by tractors and the final lighter operations and sowing by bullocks. One tractor with a complete set of farming implements and 50 pairs of bullock-ploughs will manage one 1,000-acre farm. Each tenant must own his own pair of bullocks and plough ; and he must drive it and place himself and his plough at the disposal of the farm. There must be a suitable organization for managing and directing the farm operations. The 50 tenants should first be divided into 5 sections, of 10 each. One of these 10 in each section will be selected as section leader. The 5-section leaders will form the farms managing committee. They will decide when and what type of work is to be performed and allot sections their tasks. The section leader will see that the tasks are properly carried out in time. One of the managing committee may be elected by vote as farm manager and supervisor and he will preside at meetings. He may be the only tenant not obliged to wotk his plough, so that his time may be devoted entirely to supervision and management. He will be responsible not only for the supervision of outdoor work but the keeping of the farm accounts. A single clerk should suffice for the office and accounts and a store keeper will be required to deal with the receipt and issue of produce.

The farm machinery (tractor and implements) will not be owned by the farms, but by the Estates. They will be issued to the farms for use as required. The Estates will maintain a central workshop and servicing depot, and will bear all recurring expendirure and costs of repairs and renewals. The farm will be charged a flat rate per acre for each type of operation carried out, i.e. for deep ploughing, and for harrowing. These rates will be calculated so as to cover the costs of replacing tractors and implements when unfit for further use. In order to encourage the staff of drivers, mistries, etc., to take a personal interest any profit should be shared amongst them.

(*ii*) *Village Management*—As there will be one village for each 3 or 3 farms villages, affairs should be managed, by one single committee, consisting of the farm managing committee, with the 3 or 4 farm managers as executive committee and one of them elected as Chairman. They will deal with all matters concerning the life in the village, upkeep, cleanliness, social activities, etc.

(*iii*) *Town Management*—The town will be of sufficient size to be constituted a township or Municipality and managed by its own committee constituted according to law and rule.

(*iv*) *Industrial Management*—Large industries will require expert management, so I would leave them to managing agents. Any other small home industries (which should also be encouraged) should be worked on co-operative principles under the management of the society-member with such official guidance as is desirable.

IX—Cost and Finance

It is not possible as this stage to give anything like an accurate forecast of costs. The full scope and extent of the scheme have not even been accepted yet and the details have still to be worked out. Prices and labour rates are so unsettled these days that those likely to be ruling at the time of actual construction cannot be foretold. What follows, therefore, is only meant to give some indication of the dimensions of the scheme and its financial implications, with some suggestions how these should be met.

There will be non-recurring and recurring expenditure. The former will be the initial cost of completing the scheme, the latter the cost of maintaining and working it. Non-recurring expenditure will be of two kinds; that spent outright and not recoverable, and that which would be recoverable by sale of shares or repayble in instalments. As regards recurring charges we are only concerned with those which will have to be borne by Government or the Estates. Most of the items of recurring charges will have to be met by individuals, public bodies or the agricultural and industrial concerns themselves.

The statements appended will give some indication of the expenditure involved. This has been classed as (1) non-repayble and (2) repayable; and recurring expenditure to be brone by the Estates also shown where necessary. I suggest that the non-repayable costs of this scheme should be met from money allotted out of the special funds started for post-war reconstruction and the soldiers benefit. Repayable expenditure may be financed from loans. These loans may be given by Government free of interest on the same way as interest free loans are granted to District and Municipal Boards for approved schemes of public utility. In the case of industries Government would remain the principle shareholder till the shares are purchased by the settlers. For the housing schemes the loans would be repayable on the hire purchase system spread over a sufficiently long term to ensure easy payments, in say 25 years.

The scheme as set forth is an ambitious one, and the financial implications are great. I hope, however, that it will be reduced on financial considerations. How often do we hear these days on different occasions and from diffrent sources, that we must make money our slave and not our master. I believe this scheme can be made a model to be followed for the future development which will be required in other parts of the country. This reason alone would justify the expenditure. It is befitting that the first to benefit from it should be our soldiers, but the problems it tries to solve are country wide. It must not be forgotten also that the income from land rents which would result to the Estates alone would be at least Rs.10,000. The income to Rampur State might equal a similar sum.

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Statement of costs

Item Serial no.	Particulars	Non-recurring expenditure			Recurring expenditure	Remarks and explanation
		Details	Amounts			
			(1) Non-Repayable			
			Rs.	Rs.	Rs.	
1	Roads (Main)	10 miles ..	30,000	3,00,000	3,000	This is for metalling the two main roads. They will be maintained by the Estates.
2	Roads (Branch)	25 miles ..	8,000	2,00,000	2,000	This is for making the earth roads connecting villages. They will be maintained by the Estates.
3	Irrigation tube-wells with water-courses.	80 ..	6,000	4,80,000	1,000	Recurring and running expenses will be borne by the farms themselves.
4	Drinking tube-wells	50 ..	3,000	1,50,000	500	The wells themselves will be constructed and maintained by the Estates.
5	Improvement of Irrigation works	100 miles	1,000	1,00,000	7,500	These will have to be constructed and maintained by the Estates.
6	Drainage works	80 miles ..	2,500	2,00,000	4,000	To be constructed and maintained by the Estates.
7	Anti-malarialmeasures ..	L. S. ..	..	1,50,000	10,000	Ditto ditto.
8	Village roads, drains, etc. ..	12 ..	5,000	60,000	..	After construction by the Estates they will be maintained by the village organisations.
9	Town Roads	6 miles ..	20,000	1,20,000	..	After construction they will be maintained by the town council.
10	Town drains and sanitation ..	20 miles ..	5,000	1,00,000	..	Ditto ditto.
11	Hospital and Dispensary with equipment and quarters for staff.	L. S. ..	..	1,00,000	15,000	To be constructed and maintained by the Estates including salary of staff.
12	Veterinary Hospital with equipment and quarters for staff.	L. S. ..	..	15,000	3,000	Ditto ditto.

Item Serial no.	Particulars	Non-recurring expenditure			Recurring expenditure	Remarks and explanations
		Details	Amounts			
			Rs.	Rs.	Rs.	
13	Estates offices and staffs' quarters	..	..	1,00,000	12,000	To be constructed and maintained by the Estates including salary of staff.
14	Fencing	30 miles ..	4,000	1,20,000	500	These will have to be constructed and maintained by the Estates.
		Total ..	..	21,95,000	58,500	
				(2) Repayable		
1	Village housing	12 × 250 ..	1,500	45,00,000	..	This is for providing pucca dwellings. The expenditure will be incurred from a Government loan and recovered in easy instalments on the hire purchase principles. Maintenance will be done by the occupants under this own committees' directions.
2	Town housing	6000 ..	1,500	45,00,000		
3	Industries	L. S. ..	..	60,00,000	..	This sum is expected to cover the initial industries only. Further sums will be required for development of other industries in course of time. Maintenance and management will be borne by the concerns themselves.
4	Tractors and implements ..	60 ..	30,000	18,00,000	..	This is the initial cost only. Running expenses and renewals will be met from the charges made for the work done. (*See* supplementary note).
5	Dairy cattle and machinery ..	1000 ..	250	2,50,000	..	Funds will have to be provided at the outset to enable the settlers to purchase the live stock and implements required to start work with. Recoveries could be made in easy instalments.
6	Bullocks and ploughs and carts for tenants.	2500 ..	400	10,00,000		
		Total ..	..	1,80,50,000		

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Supplementary Note on Tractor Farming for the small tenant

1. This note explains how the productive power of the cultivator can be increased by affording him the use of tractors with up to date farming implements, and also how the provision of these machines can be financed. The idea put forward is farming with a combination of tractors and bullock ploughs the former doing the heavy work of deep ploughing, harrowings, etc. and the latter the lighter operations such as sowing, inter-culture, weeding, etc. Obviously the cultivator or even a group of them could not be expected to purchase and run a tractor unit. These will, therefore, be provided by the Estates and a charge made per acre for ploughing and harrowing actually done. The cultivator would, however, own and work his own bullock plough and perform the other labour operations required.

2. The following figures show to what extent the earning power of the cultivator will be increased. As a general rule a tenant with one plough has a holding of 5 acres, but an energetic good cultivator may manage a holding of about 10 acres, including sugarcane in addition to the usual *rabi* and *kharif* crops. A tractor and 12 bullock ploughs can manage at least 500 acres of cultivation and generally much more. Thus the minimum area per plough with tractor would be 40 acres as compared with a maximum of 10 acres without tractor. Not only is the area per plough 4 times as great, but the yield from tractor ploughed lands with better farming methods will be greater so that the total value of crops may be five times.

These proposals, however, aim at alloting only 20 acres per plough, as this area should suffice to give a cultivator a very good livelihood.

3. Assuming that the rotation of crops mentioned in paragraph .. of the report is adopted, each holding will produce the following crops in one plot every year :

1 crops of sugarcane.
1 crop of sugarcane ratoon.
1 crop of rice (or maize, etc.)
1 crop of wheat.
1 crop of gram.

Assuming reasonable yields and prices the following would be the return per plough to the tenant in each of the two cases, i.e. (1) working 10 acres with bullock plough alone and (2) working 20 acres with the aid of tractors.

(1) *Bullock plough alone*
5 plots of 2 acres each

Crop	Yield per acre	Yield in 2 acres	Rate per maund			Value	Remarks
			Rs.	a.	p.	Rs.	
Sugarcane	300	600	0	6	0	225	It is assumed that all the labour will be provided by the cultivator and his family and that no extra labour will be hired.
Sugarcane ratoon ..	200	400	0	6	0	150	
Rice	12	24	4	0	0	96	
Wheat	12	24	4	0	0	96	
Gram	10	20	3	0	0	60	
		Total value ..				627	

(2) *Bullock plough and Tractor*

5 plots of 4 acres each

Crop	Yield per acre	Yield in 4 acres	Rate per maund			Value	Remarks
			Rs.	a.	p.	Rs.	
Sugarcane	450	1,300	0	6	0	675	As the quantities to be harvested are great it is presumed that some extra labour will have to be hired.
Sugarcane ratoon ..	300	1,200	0	6	0	450	
Rice	15	60	4	0	0	240	
Wheat	15	60	4	0	0	240	
Gram	12	48	3	0	0	144	
		Total value ..				1,749	

	Rs.
Deduct—	
(1) Cost of tractor ploughing:	
(*a*) 1 deep ploughing 4 acres at Rs.12 per acre ..	48
(*b*) 8 harrowings 4 acres each at Rs.6 per acre ..	192
(2) Cost of special manure, etc.	50
(3) Cost of extra labour for harvesting—	
(*a*) Sugarcane 3,000 maunds at one anna per maund	188
(*b*) Other crops 168 maunds at 2 annas per maund ..	21
Total deductions ..	499
Net return ..	1,250

The above represent the probable return to the tenant for his own and his family's labour per plough in each case. The figures are not absolute, as there are many varying factors, such as yields, prices, labour, wages, etc. They, however, not only serve for comparison but represent reasonable expectations. From these earnings he of course has to meet all his expenses, such as rent, maintenance of plough and cart, etc. In both cases his expenses will be similar so that it is obvious to what extent he will be better off if helped by tractors. –

(4) The following represents approximate costs for a single tractor with implements. The prices are those which obtained two years ago. It is impossible to forecast what they may be later :

Capital outlay

	Rs.
Tractor	20,000
Implements—	
Disc plough	4,000
Disc harrow	4,000
Miscellaneous	2,000
Total ..	30,000

Depreciation taking life at 7,200 working hours

$$=\frac{20,000}{7,200}=4\cdot 1/6 \text{ per hour.}$$

Depreciation per year for—

1,200 hours = 4·1/6 × 1,200 = Rs.5,000.

Working expenses

	Rs.
Staff—	
1 driver at Rs.50 per mensem	=50
1 assistant and cleaner at Rs.30 per mensem ..	=30
2 coolies at Rs.15 per mensem	=30
Total, per month ..	=110

Total, per year=110 × 12 = Rs.1,320

	Rs.
Fuel oil 3 gallons per hour for 1200 hours = 3,600 gallons at annas 8 per gallon	=1,800
Lubricating oil 1/50th gallons per hour for 1,200 hours = 25 gallons at Rs.4 per gallon	=100
Grease, annas 4 per hour for 1,200 hours	=300
Miscellaneous anna 1 per hour for 1,200 hours ..	=75
Spare parts 1/3rd of depreciation charges	=1,667
Annual overhaul lump sum	=500
Total, annual expenditure including depreciation	=10,762
Say ..	10,800
Expenditure per acre = 10,800/900	=12

Taking the number of working days in a year as 150, each of 8 hours, the total working hours for the tractor will be 1,200 per year. On the assumed rotation each plot requires 1 deep ploughing and 8 harrowings every five years. Assuming a ploughing to take twice as long as a harrowing, this would be equivalent to 10 harrowings. A tractor of the size contemplated can harrow 1½ acres per hour. Therefore, the number of acres which can be worked in a year would be :

1,200 × 5/10 × 1½ = 900 acres.

Actual working days may be increased so that the tractor could cope with over 1,000 acres. But 900 has been accepted for working out costs, etc. to be on the safe side. Also by increasing the actual number of working hours to 180, 20 per cent. of the total number of tractor will be in reserve. In actual practice we would allot one tractor for each 1,000 acre farm and have 1 in reserve for evey 4 or 5 farms.

5. The rates to be charged for ploughing and harrowing have been worked out as follows. The costs per working hour have first been taken and these have been converted into rates per acre.

	Depreciation	Spares	Labour	Fuel and labour	Annual overhead	Total hour	Rate per acre
							Rs.
(1) Deep-ploughing in 1½ acres per hour.	4·17	1·39	1·1	1·9	0·42	8·98	12
(2) Harrowing 1½ acres per hour.	4·17	1·39	1·1	1·9	0·42	8·98	6

I have been conservative in my estimate of working capacity. Makers claim as much as 1 acre per hour ploughing and 1¾ per hour harrowing and even more.

The expenditure incurred on tractor ploughing would be recovered from the farms at the above rates. The annual recoveries would be as follows :

	Rs.
180 acres deep ploughing at Rs.12	=2,160
1,440 acres harrowing at Rs.6	=8,640
Total ..	10,800

6. It will be noticed that the rates chargeable include depreciation so that the whole capital outlay would be recovered in six years, if the tractors work to full capacity from the start. Interest on the initial expenditure has not been taken into account as the tenants may be given the benefit of this concession. As I have taken the life of equipment as only 7200 working hours, against a minimum of 8000 and often much more taken by manufactures it is likely, however, that the Estates would recover more than its interest charges in the seventh and subsequent years of working.

7. Each tractor unit would entail an initial outlay of Rs.30,000. As the life of the plant has been taken as six years replacement of complete units would commence from 7th year. So there would be a recurring expenditure of Rs.30,000 on each tractor every six years. But recoveries for depreciation would be taking place at the rate of 5000 per tractor every year. If one out of every six tractors were replaced every year the annual expenditure on replacement would be Rs.30,000 but the annual recoveries would be 6 × 5000 which is Rs.30,000 also. The account of expenditure and recoveries for six tractors from the first year onwards as shown in the attached statement. This shows clearly how the expenditure is completely liquidated. The cost of every tractor is recovered in full in six years, and even the annual outlay and recoveries balance. If in actual experience the average life of the tractors may be found to differ from that accepted in this note, this will simply require modification the figures to balance expenditure and recoveries within the actual term of life.

8. As each tenant's holding will be 20 acres, each plot for five years rotation would be 1/5 of 20, i.e. 4 acres only. This is not a suitable size for efficient tractor work. A minimum of 20 acres is desirable, so some sort of collectivization will, therefore, be necessary. I am in favour of a complete collective system. Besides the above, there are serveral reasons for this. In the first place it is essential to retain each farm as a unit and work the rotation of crops in strips or blocks. If we allow individual holdings it could easily result in individuals deviating from the plan, and throwing the whole scheme out of gear. Furthermore, individuals would have a right to relinquish part of their land, which might result in some being left with uneconomic holdings and others with too much. Then again there will be different classes of soil, some of which may be inferior or suit-

able only for particular crops. Individual holdings may result in some gaining advantage over others, whereas collectively all would share proportionately to the labour each puts in. Collective cropping has been suggested by some as an alternative, but it does not remove or overcome these objections. Unless the farm is worked as one unit to a single plan and policy the very foundation of the scheme would be unsound. We have to guard against its disintegration into a number of separate units, and that can only be done by refusing individuals the right to any particular plots. They must only be allowed to be share-holders or part owners of the whole.

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Account of expenditure and recoveries from tractors

Year	1st tractor		2nd tractor		3rd tractor		4th tractor		5th tractor		6th tractor		Total	
	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	30,000	5,800	..	..	..	..	..	..	..	..	..	..	30,000,	5,800
2nd	..	5,800	30,000	5,800	..	..	..	..	..	..	..	..	30,000	11,600
3rd	..	5,800	..	5,800	30,000	5,800	..	..	..	..	..	..	30,000	17,400
4th	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	..	..	30,000	23,200
5th	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	30,000	29,000
6th	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	30,000	34,800
7th ..	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	24,800
8th	..	5,800	Replacement. 30,000	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	24,800
9th	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
10th	..	5,800	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	30,000	34,800
11th	..	5,800	..	5,800	..	5,800	..	5,800	Replacement. 30,000	5,800	..	5,800	30,000	34,000

	Recoveries													
	1st tractor		2nd tractor		3rd tractor		4th trctor		5th tractor		6th tractor		Total	
Year	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	5,000	5,800	..	..	..	..	..	..	..	..	..	..	5,000	5,800
2nd	5,000	5,800	5,000	5,800	..	..	..	..	..	..	..	..	10,000	11,600
3rd	5 000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	..	..	15,000	17,400
4th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	20,000	23,200
5th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5 ,800	..	..	25,000	29,000
6th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
	30,000													
7th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
			30,000											
8th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
					30,000									
9th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
							30,000							
10th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
									30,000					
11th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
											30,000			

APPENDIX II

Mr. Radha Kant's

(i) Naini Tal Tarai Colonization Scheme for ex-servicemen.

(ii) North Kashipur Colonization Scheme for ex-servicemen.

(iii) North Afzalgarh Colonization Scheme for ex-servicemen.

(iv) Lakhimpur-Kheri Colonization Scheme for ex-servicemen.

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NAINI TAL TARAI COLONIZATION SCHEME FOR EX-SERVICE MEN

Situation of the Area Selected

THE area selected for colonization lies between the Bareilly-Kathgodam metalled road on the east, the Baur on the west, the Rampur State territory and Bareilly District on the south and a line in the north about 4 miles short of the Lalkua-Kashipur railway line up to Rudrapur-Haldwani road, thence about 2½ miles short up to Gadarpur-Haldwani road and thereafter the railway line forms the boundary up to the Baur. The northern line is depressed in order to avoid the belt of springs and the region of its repercussions. The area thus available for colonization comprises about 105,071 acres roughly 164·2 sq. miles, and is demarcated on map (Appendix 'A') attached.

Brief Description of the Tract

2. The Tarai stretches from the Sarda on the east to the Kashipur pargana on the west and includes the parganas of Bazpur, Gadarpur, Rudrapur, Kilpuri, Nanakmata and Bilehri. It is in the charge of the Superintendent of the Tarai and Bhabar, who is a Senior Irrigation Officer and is responsible for the administration of the area. He is assisted by the Tahsildar of Kichha and his subordinates, the Peshkars or Naib-Tahsildars, who have their headquarters at Bazpur and Khatima. The tract may be divided into three parts. The parganas of Nanakmata and Bilehri under the Peshkari of Khatima form the eastern part of the Estate and are highly cultivated by the industrious Tharus who are careful cultivators. The area is notoriously malarious. The parganas of Kilpuri and Rudrapur in tahsil Kichha constitute the middle portion of the Tarai. Kilpuri is also highly malarious and is largely cultivated by Tharus. Pargana Rudrapur which comprises the area around Kichha and Rudrapur is comparatively healthier largely on account of the absence of irrigation. In this region big farmers hold large blocks of land on long leases. Of these the Prag Farm, Kesar Sugar Factory Farm and Bhatnagar Farm are located on Kichha side growing sugarcane for Kesar Sugar Factory at Behari and the Punjab Sugar Works at Gokulnagar. Cultivation grows sparse towards Rudrapur. Parganas of Bazpur and Gadarpur under the Peshkari of Bazpur form the western part of the Estate. The climate of Bazpur pargana is far better than that of any other pargana, a feature attributed to the lack of water for irrigation purposes. This pargana is largely the preserve of the Buxas who are very extravagant and wasteful in the use of land and water. Gadarpur, highly malarious, lies in a depression and is well supplied with canal systems, two main factors which have rendered its climate worse.

The area selected for soldiers' settlement includes 103 villages : 51 fall in pargana Rudrapur of Kichha tahsil with an acreage of 38,855 and 52 in pargana Gadarpur of tahsil Bazpur with a total acreage of 37,664. In addition to the above, 10,087 acres pertain to Gangapur pattia block, 7,772 acres to Dhimri block, 5,146 acres to Haripura block and 5,557 acres to Dalpura block, all in the forest areas, making a total of 105,071 acres. The whole of this area falls in what may be called the mid-Tarai and the lower Tarai belts of the central portion of the Tarai of the Tarai and Bhabar Estates belonging to Government. To the north of the Tarai lies the Bhabar tract stretching up to the foot of the hills. Lalkua may be taken as the southern boundary of the Bhabar whence the Tarai belt may be deemed to commence. The Lalkua-Kashipur railway line almost serves as a line of demarcation between the Tarai and the Bhabar so far as the tract under examination is concerned. On either side of the railway line to about 4 miles south of it lies a belt of springs suggesting artesian conditions. These springs rise in a series of morasses that are formed along the southern edge of the Bhabar by syphonic influence on the subterranean drainage. In this region (the upper Tarai) the sub-soil water table approaches very near the surface of the ground and the wet conditions are most pronounced as a result of a number of small streams emerging from them. No less than 12 such *nadis* emerge from a belt, 6 miles long and 4 miles wide, lying to the south and west of Lalkua. Further west, the line of springs seems to rise higher as almost all the streams come from sources beyond the railway line. Rank vegetation exists in the 'belt of springs'. Though cultivation is possible, for health and climatic reasons it is desirable to leave the area for grazing purposes and to form a fuel and timber reserve for a part of the colony. Conditions gradually improve as we go south. The spring level in the lower Tarai, although high, is lower than in the upper Tarai and the ground surface is well drained owing to the cross slopes. But the area as a whole is damp, malarious and unhealthy. In fact the tract has suffered as much from its unhealthiness as from the depredations of wild animals, and these two factors are jointly responsible for the gradual depopulation and deterioration of the tract. The large areas of forests have also a most pernicious effect on the climate and have contributed not a little towards making the tract unhealthy. Statistics secured over a number of years tend to show that every year there is an excess of death over births, resulting in a gradually diminishing population. With the fall of population, cultivation has also been declining from year to year. Communications are poor, at times difficult even for country carts to negotiate. In short, life in the Tarai is but a continual struggle for existence against the depredations of wild animals, luxuriant vegetation, depressing climate, a high death rate and bad communications. The recital of this depressing story is necessary in order to properly comprehend the magnitude of the task involved in developing the tract.

The country is of a most intricate nature, characterized by its large Savannash of tall grasses and reeds, tracts of forests mostly of an inferior nature with scattered patches of cultivation generally in the southern half and a network of spring-fed streams bordered, by overhanging trees and tall *sarpat* grass and a tangled growth of creepers that only an elephant can surmount. In the Gangapur pattia block there are some valuable *semal* trees used by the match factories at Clutterbuckganj (Bareilly) and Rampur and a number of *khair* trees, used for manufactre of catechu. But the other Forest Blocks (the Dhimri, Haripura and Dalpura) are mere scrub jungles. With the clearance of the grass lands and the inferior forests there is no doubt that considerable improvement in the health conditions can be effected. The soil is fertile and owing to its inherent capabilities the outturn of crops is excellent. The extensive grass lands are ready to be brought under the plough. Almost all the crops of the plain districts can be raised without the aid of irrigation. The soil is generally heavy loam with a high degree of humus content but further west it tends to be clayish in the depressions which are generally found between the Dhimri and Gadarpur and a little beyond. These soils are particularly suited for rice cultivation. Broadly speaking the soil is a rich loam and very fertile. Of the larger streams that flow through the tract the only one that causes any considerable damage is the Bhakra which rises near the Fatehpur block at the foot of Naini Tal hills and flows into the Tarai. The other spring-fed streams, in spate during the monsoon, generally remain confined to their bed and seldom cause any damage. In the monsoon period they serve as drainage channels quickly carrying away the surplus water. It is because of the streams that the tract under examination is singularly free from swamps and *jhils*. The slope of the country is fairly gradual being 10—12 feet to the mile on the average, a factor which is responsible for the good behaviour of the streams.

Magnitude of the Problem

3. The story of Tarai is every depressing. The unhealthiness of the tract and the depredation of wild animals have worked its downfall. Always sparsely populated, the serious influenza epidemic of 1918 caused a great decline of the man power and from that time may be dated the commencement of the more rapid deterioration. As the size of the families were reduced, lands fell out of cultivation, jungle conditions increased, and with it the depredation of wild animals, to make the downfall complete. A dimunitive population is heroically trying to keep as much area under cultivation as possible but the difficulty is that, due to lack of men, they have to plough the land and perform the mainfold agricultural operations in the day and to keep up a vigil at night, crying themselves hoarse to keep the nocturnal desperadoes away from their fields. Unable to rest at night after the hard day's work, their vitality is gradually lowered only to fall an easy prey to malaria, thanks to the deadly anapholenes and culicifacies which find a willing victim in the man sitting or lying exposed in *machans*. The forests are slowly but surely encroaching on cultivated areas affording wild animals greater shelter and bringing them nearer to cultivation and habitation and at the same time increasing the unhealthiness of the tract by their very existence which encourages undergrowth and dampness by preventing the sun's rays from reaching the earth. In a tract where the water table is already high and moisture excessive, the indiscriminate construction of canals and the promiscuous building of water channels and dams by one and sundry over streams in succession, without regard to the natural drainage, have proved disastrous to the land and the climate. The canals, if anything, help to

raise the water level which encourages dampness and water-logging and thus increase sickness around. Means of communication are appalling so that it is not economic to transport field produce to markets, and often the cultivators have to part with their produce at very cheap rates to buyers who can manage to cart the same. People have become greatly disheartened and the notoriety that the tract has earned over a long period of time will always prove a serious obstacle to any plan of development. I mention these facts not with a view to discourage any scheme of colonization in this part but to bring out the magnitude of the problem and to stress the necessity of overcoming these difficulties by sustained and vigorous action as also to suggest directions in which the endeavour may be made. The real problem of the tract is the making of an effort in a BIG WAY, and in a manner that may convince the people of the same. ✓Unless a bold scheme of development is chalked out and pursued with all the resources at the command of the Government, I would not suggest the colonization of the area by ex-servicemen. Small efforts have been made in the past by individuals and Companies but they have failed and the ex-soldiers cannot be drafted to the tract to face the danger of annihilation. I, therefore, wish to submit with all earnestness that this area should only be tackled if a decision is reached that the area WILL be developed. Having inspected the area carefully and discussed the subject with the people and persons who are familiar with Tarai conditions I am decidedly of the opinion that the area is capable of development and can ultimately become an important granary of the Province. ✓It is true that malaria cannot be completely got rid off but it can be made reasonably healthy for settlers by taking action on the lines suggested in the subsequent paragraphs. Even control of malaria bristles with difficulties and will require a permanent anti-malarial organization and recurring expenditure. There is an element of trial and error in any scheme of development, and I think this land with its excellent soil should be tackled in that spirit. Assuming that it will be possible to adopt a consistent policy of vigorous development, I proceed to examine Sir William Stampe's objections and the various aspects of the scheme in detail.

Sir William Stampe's Report Examined

4. I am conscious of my own limitations as a layman in making observations on the report of an Irrigation Expert of the eminence of Sir William Stampe. I have, however, inspected typical parts of the area and have discussed the question of the development of the Tarai with local revenue officers and old inhabitants of the region including Lt.-Col. Corbett who possesses a unique knowledge of the tract by reason of his long residence and repeated excursions throughout the area in the course of his hunting expeditions. It is, therefore, after a good deal of thought and enquiry that I venture to make my observations for all they may be worth. I am fortified in my belief by the conclusions reached in the excellent colonization scheme produced by Mr. J. W. Russell, I.S.E., for the development of the tract. Mr. Russell has been in the area for long and possesses a vast knowledge of local

conditions. He is convinced that the tract is capable of development provided the same is carried out on a long-term basis in prosecution of a definite policy of Government. On the other hand Sir William Stampe has submitted a report condemning the scheme for development on the ground that the numerous streams which flow through the area interfere with the drainage system leading to ultimate water-logging and sickness, being unable to provide for effective drainage of all the surplus water. From this it is argued that the tract must remain malaria-ridden and unhealthy for ever. I have nothing to say to his elaborate and scientific exposition of the causes of defective drainage inherent in the river system of the Tarai in general, but I do wish to submit that all those causes do not really apply in their full force to the central parts of the Tarai which are proposed for settlement. The sole objection is in regard to defective drainage, and I wish to examine the arguments in detail with special reference to the tract under examination. Sir William's arguments for the defective drainage of the tract may be summarized as below :

(1) that, as a result of the extremely heavy rainfall in the hill zone and the outer hill zone, 'the run off' is very rapid resulting in heavy spates down the main rivers, and that these spates tend to check the lateral drainage ;

(2) that the high grass with its stubby roots and patches of forest in the Tarai check the flow of water with the result that the country is drained badly and swamps are formed ;

(3) that the winding courses and duplicated or triplicated channels of the Tarai streams and the general instability and extreme variations of flow cause defective drainage, and

(4) that the unscientific layout of the Tarai canal sytem is a contributory cause of flooding.

I propose to take up these points serially with special reference to the tract which is proposed for development.

Heavy Spates as an Obstruction to Lateral Drainage

The tract lies between the Bareilly-Haldwani road in the east and the Baur in the west. In between this area there is only one river, the Bhakra which may be said to rise from the foot of the hills (Naini Tal-Fatehpur Range) in the north. The primary or hill-fed streams are the Kosi, Gaula and Nandhaur but none of them flow through the area with which we are concerned. The excessive rainfall in the hills and the consequential acceleration of the 'run off' and flooding of these rivers do not affect the part of the territory we are concerned with. It is only the Bhakra which does some considerable damage but that is far towards the west of the proposed colony nearer to Gadarpur, some 13 miles away from the eastern boundary of the proposed colony. So that in a length of about 12-13 miles and width of about 10 miles there is no hill-fed river to go in spates and cause flooding, water-loggind and defective drainage. This is a safe area wherein to locate the colony and later it can expand further west by training the Bhakra so as to make it harmless. There appears to be no reason why the whole of the Tarai (including the central portion) should be condemned because of defective drainage elsewhere. Excluding these hill-fed rivers the others are mere Tarai streams which have their origin in the morasses in the north and are ordinarily sluggish rivers. In these streams, oozing out of the springs, there is never a heavy intake of water except during monsoons when they do carry a heavy downpour but it is a matter of common knowledge that the flood water recedes within a few days, being carried off by these water courses. It is remarkable testimony to the drainage efficiency of these streams that there is practically no swamp in the central parts of the Tarai proposed for colonization. I have learnt on very careful inquiries made on the point that the flood water always recedes within a few days and no water-logging is caused on account of them. As regards obstruction to lateral drainage no such eventuality can arise as the tertiary streams are seldom in spate, and if ever only for a few days during the monsoon.

High Grass and Patches of Forest as Causes of Defective Drainage

In any scheme for the development of the Tarai, the clearance of the grass lands and jungles is of supreme importance. It has to be adopted as a cardinal point in the scheme of development, and no apprehension to the obstruction of drainage need be entertained on that score. As already mentioned there are no swamps and no serious water-logging exists in the area we are tackling.

Winding Rivers and Multiplicated Course as Causes of Defective Drainage

Notwithstanding winding rivers and duplicated and triplicated channels and variable and unstable flow of water it is submitted that there is no real obstruction to drainage as is evidenced by the almost entire absence of swamps and water-logging, at least in the central parts of the Tarai. In fact surface drainage requires generally no attention and this point has already been made clear by Mr. Russell in his report. Whatever small amount of drainage has to be done will only be required in respect of regrading and remodelling of some canals and drains. The multiplicated courses generally appertain to the bigger rivers of which only one falls in the colony (the Bhakra) but it is in one corner.

Tarai Canals as Contributory Cause of Defective Drainage

That the existing canals are not at all scientifically aligned and constructed has been stressed by all the experts who have studied the Tarai problems. Matters have been complicated by the original settlers—the Buxas—who go about making indiscriminate earthen bunds which cause obstruction to the natural drainage of the country. I shall have to say more on the subject when discussing the problem of irrigation, and it may only be pointed out here that this is not an intractable problem. Sir William Stampe has himself emphasized that it is a problem "which can definitely be eliminated".

Drainage as a Serious Problem

The only argument in Sir William's report against development of the tract is in regard to its defective drainage as caused by the hill-fed streams. This is, no doubt, true in respect of the other parts of the Tarai where the hill-fed streams run down in spates but these remarks do not apply to the tract under consideration. In fact, drainage does not present a serious problem at all in this tract. Mr. Rusell who studied the problem thoroughly says in his report "surface drianage requires practically no attention generally. With a longitudinal slope of about 10 feet a mile in the northern tract reducing to about 6 feet per mile towards the southern end, and correspondingly higher transverse slopes the country is already well drained. The exceedingly few depressions can be dealt with without particular difficulty a small degree of canalization and regrading would improve sub-soil drainage and make anti-malarial control easier. There are a few water-logged areas, usually of no great size, bordering some of the streams. Underground sub-soil drains, with some filling and levelling of the ground will remedy this. The drainage problems are, therefore, comparatively small and simple." The Director of Agriculture of Rampur State who reported on the Agricultural prospects of the area says "the whole tract is intersected by a number of streams which drain the area. At this time of the year it does not appear that any portion of the tract is subject to water-logging for a considerable period even during the monsoon. Low-lying areas of the tract might suffer from water-logging for a few days if the rains are exceptionally heavy but not otherwise. Inquiries made from the local inhabitants confirm this observation." Lt.-Col. Corbett who possesses unique Tarai and jungle experience gave his considered opinion that the tract was capable of development if worked on proper lines and that the scourge of malaria was bound to diminish with the opening up and clearance of the country. He stressed the importance of starting colonization from the existing sites of habitation and established cultivation. Mr. Mandkey a very capable Agricultural Engineer who is in charge of the Mathkhera Farm in Rampur State was very confident of the development of the tract when I saw him at his Farm. He has had considerable experience of European agriculture and specially of this kind of work in East Africa in one of the Kenya colonies where he was for several years. Mathkhera Farm is situated in an unhealthy tract, being known as Mauthkhera (abode of death) due to the high incidence of death from malaria ; but the whole area has considerably improved in point of health and general development as a result of the opening up of the country. Mr. Mandkey was clearly of the opinion that the reclamation of land in the Tarai region could be made successfully if the land was opened up and cleared of grasses and forests. Judging by the success that he has achieved in reclaiming the area at Mathkhera, I think, his opinion is entitled to respect and consideration. A perusal of the file relating to the reclamation of Tarai shows that the scheme for development was in quite an advanced stage when efforts in the direction were abandoned as a result of Sir William Stampe's report. This report does not seem to have been examined with a view to find out the real parts of the Tarai to which it related, and Mr. Russell who prepared such an excellent scheme does not seem to have had an opportunity of studying Sir William's general criticisms with special reference to the tract under examination. I think Mr. Russell will agree with me that Sir William's objection is only from the drainage standpoint which is not a real problem in the tract proposed for colonization. My objection in stating these facts is only to show that the drainage is not a serious problem, and not to minimise the various problems that militate against the prosperity of the Tarai. The vastness of the problem has already been described at some length in an earlier paragraph.

Drainage and River System

5. The general trend of the slope is from north to south, inclining westwards in the west and eastwards in the east. The drainage system of the Tarai has been very aptly likened to "the reticulations of a leaf, the streamlets on the edge of the moist country uniting to form larger channels which again feed the arterial lines of drainage and all eventually join the great midrib stream, the Ramganga." The slope is generally about 10 feet to a mile which is quite favourable to natural drainage. The few depressions here and there and alongside the streams will require the construction of some outlets to be joined to other lines of drainage. By indiscriminate construction of earthen dams at the various stages of the streams the Buxas have done their worst to interfere with natural drainage but this nuisance is generally confined to the western portions in the neighbourhood of Gadarpur. A number of canals and the few drains that exist are in a very bad state of repairs and cause water-logging. The system of irrigation from obstructed streams, as usually practised in the Tarai, is responsible for a good deal of its unhealthiness. These are, however, man-made causes interfering with natural drainage and can easily be eliminated by planned action.

Taking up the river system, the area under examination may be divided into three tracts bounded by the three main rivers that flow through it, namely, (1) the area between the Bareilly-Haldwani road and the Dhimri, (2) the area between the Dhimri and the Bhakra and (3) the area between the Bhakra and the Baur. Incidentally, our colony will have to be developed in three stages, each one coinciding with the above delineation. The first-named area contains the largest number of streams (the Beni, Badaura, Chakpheri which later is known as Madni, Gandalia, Phulwa, Haldi, Jaintha, Bhanga which later is known as Baghai, Baighul, Juria, Padra. Patharghatti and Gajuru) working out to about a mile, but they are mere spring-fed streams which do not cause any appreciable harm to cultivation. Through the second area flow the Khairia, Kagarsen, Khania, Bhutwa, Andhuwa and Ajgara. In the third area flow the Khajua, Nihal, Saudia and Kakrala. Several of these streams unite with each other so that by the time the southern belt is reached the number of streams is reduced. The streams have scoured a deep bed through which they meander slowly but at places the banks are breached either because of the weakness of the soil or as a result of being used as fords. It is here that the land becomes boggy due to continuous passage of carts and animals and encourages formation of breeding places for mosquitoes in the rainy season. Where such fords exist near habitations, it will be necessary, as an anti-malarial measure, to build causeways to eliminate marshes. This will not be an expensive item for the normal area allotted to a village would be about 4,000 acres so that in a 10,000 acre plot taken up for development and colonization in the first year not more than three villages will be founded of which one will be about the Bareilly road. Thus in one year only two or three causeways will have to be constructed.

Besides facilitating natural drainage these spring-fed streams also tend to conserve soil and the trees that abound on the banks check soil erosion. Mr. Hutton in his report on Tarai canals has found these streams of considerable utility for another reason. "These Tarai streams"; he writes, "are blocked in their courses with fallen trees and overhanging branches to an extent almost inconceivable to one not acquainted with them, and in high flood the velocity is greatly diminished by their presence. I consider it for this reason of the greatest importance that a narrow belt of trees should be maintined around the course of every stream which should never be allowed to be encroached on by cultivators." In developing the area this point will have to be borne in mind. As the settlers in each village will need sufficient lands for pasture, timber and fuel, it will be necessary to keep a belt stretching on either side of the streams to the depth of a furlong or so exclusively under the trees and grass. In the case of the bigger streams, the Dhimri, Bhakra and the Baur, it may be necessary to expand the belt to about half a mile as these rivers occasionally rise in floods damaging cultivation in the neighbourhood. The indiscriminate obstruction to the streams will have to be stopped unless specially permitted by the Irrigation authorities. I do not think any costly training of the streams will be required. About half of our colony will be located between the Haldwani road and the Dhimri where no floods from rivers need be apprehended, and this will mark the first stage of colonization. After sufficient experience of colonization in this part has been gained, the colony can be expanded westwards, in two stages, right up to the Baur. Already quite considerable areas between the Bhakra and the Baur are under cultivation and with proper development the soldiers' colony is capable of extension to those parts.

Markets and Means of Communication

6. The chief market for the Tarai and Bhabar is Haldwani. The other important markets are Kichha and Gadarpur while quite a considerable trade also takes place with Bilaspur in the Rampur territory. The main Tarai road passes along the south of the Estate connecting Kichha with Gadarpur and ultimately with Bazpur and Kashipur. The road is metalled only up to Rudrapur, a distance of about 9 miles from Kichha. ✓Two unmetalled roads radiate from Rudrapur, one going to Haldwani in the north and the other to Bilaspur in the south. Likewise two *kachcha* roads branch off from Gadarpur, one leading to Haldwani *via* Gularbhoj and Pipalparao and the other southwards to Rampur. These form the important means of communication but the *kachcha* roads are in a hopelessly deplorable condition. Good roads are an important pre-requisite to development and I cannot sufficiently

emphasize the importance of metalling them in the interest of the development of the country. At Gadarpur I was given to understand that owing to the badness of the roads the *banias* and *beoparis* from Rampur and elsewhere, who could manage to bring bullock-carts or pack mules up to Gadarpur, could purchase foodgrains even in these hard times at very cheap rates. They were apparently trading on the helplessness of the cultivators who were otherwise unable to arrange for the marketing of their produce. It cannot be gainsaid that the improvement in the means of communication will go a long way in the development of this backward tract.

Colonization may be attempted in instalments but the road construction programme must be taken up as a whole, all in the very first year. To accelerate the progress of development and encouarage colonization, it is imperative to open the country as extensively as possible. I would propose that the section of the main Tarai road between Rudrapur and Gadarpur (11 miles) must be metalled, though it would be far better to do it up to Bazpur. From Rudrapur much the best thing to do would be to metal the road right up to Haldwani, a distance of 20 miles. But if this is considered as very expensive, the portion between Rudrapur and Tanda (8 miles) should be metalled at once along with the 5-mile stretch of the forest road from Tanda to Lalkua so as to allow of cart traffic to Haldwani *via* Tanda and Lalkua. Similarly, the Gadarpur-Haldwani road (about 20 miles) should be metalled outright, failing which the 6-mile section up to Gularbhoj railway station and the 8 miles of the forest road between Gularbhoj Khata and Tanda be metalled to connect up with Lalkua. In addition to these, small feeder roads from the main roads to the villages to be founded will have to be constructed in order to allow of easy transport of agricultural produce. If the tract is thus opened up its prosperity can easily be assured. Total mileage of construction and capital outlay involved will be discussed in a subsequent paragraph suggesting lines along which development may proceed.

Rainfall

7. The mean annual rainfall at Rudrapur is 45″ of which 10″ fall in October—May, and 35″ in June—September. At Kichha the mean rainfall is 50″ (10″ *plus* 40″). Thus the mean annual rainfall of the Tarai may be taken at about 50″.

Irrigation

8. Irrigation is, generally speaking, of no importance. In fact, if I may say so, the tract has already suffered from an excess of irrigation. The spread of canal water tends to force up the water level, aggravating moistness and sickness. The wasteful methods of irrigation employed from a long time past, particularly by the Buxas, by the construction of numerous earthen dams without consideration of the drainage lines has been responsible for the deterioration of the tract and increasing unhealthiness. The unscientific layout of the local canal system is now recognized on all hands, and often the canals have been found to be the source of creating water-logging. In order to reduce their powers of mischief they will have to be treated by a process of lining, or in the

alternative underground concrete pipes may be laid, at least in bad spots, so as not to be liable to damage by cattle and at the same time to prevent leakage and stagnation. Mr. Russell even went to the length of suggesting that the canals should be scuttled altogether for anti-malarial reasons. In my opinion a measure of control on canal irrigation and closure of faulty and unimportant irrigation channels is called for urgently in the interest of proper development. There are a number of canals which are no better than *kachcha* drains, which, from their dilapidated condition, not only cause water-logging, but also facilitate the breeding of the mosquitoes. I have seen very good dry cultivation in the neighbourhood of Kichha where there is practically no canal sytem. Enquiries made by me at the Kesar Farm established were obtaining a yield of 650 maunds per acre of planted sugarcane and about 400 maunds per acre of ratoon cane, and all this without irrigation. Unirrigated wheat and paddy came to 16 and 15 maunds an acre respectively. These are excellent out-turns. The soil and sub-soil conditions are such that with the amount of rainfall that is obtained in the tract, moisture is retained close to the surface seen in the dry months of the year. It may be possible to obtain somewhat higher figures of yield by allowing irrigation, but at what cost?—at the cost of increasing malaria and sickness around. I think in a tract like this we should rather have lesser out-turn than cause depopulation, sickness and death.

Canal *versus* Tube-well Irrigation

The question that next arises is, will it be safe to do entirely without irrigation. There can be no doubt that we must be prepared for abnormal seasons when irrigation may be essential to save the crop from failure due to drought. A cheap source of irrigation will have to be provided to the cultivator, in order to provide a 'stand-by' in times of need. I think we should tap a source which will draw out water from the sub-soil rather than add to it by a process of percolation from canals. This source is obviously the tube-well. The tube-wells should prove a business proposition and the matter may usefully be enquired into by a tube-well expert. Mr. Russell thought that power could be obtained from diesel engines or tractor engines when the tractors were not in use for the breaking up of land. Even if tube-well irrigation is not ultimately found to be economically justifiable, it will be necessary, for ante-malarial reasons, to reduce the number of canals as far as possible. I need not expatiate on the advantages of tube-well irrigation as I find that the matter has been elaborately discussed by Mr. Russell in his letter to Sir Colin Garbett and in his report on the development of the Tarai. Extracts from them are reproduced in Appendix 'B' for further information on the subject.

Drinking Water

9. In the considered opinion of the Public Health Department, water of the Tarai is injurious to health if obtained from surface wells which tap the top levels of sub-soil water table. The water is usually contaminated by the rotting of vegetable matters. It is commonly

held that the water drawn from reservoirs nearer the surface aggravafes the malarial conditions if it does not actually constitute one of the sources of infection. It will be necessary to sink tube-wells to obtain water for human consumption. Even ordinary handpumps will do, provided the boring is done sufficiently deep to obtain a clear supply of healthy water from sources deep down in the earth. As the colony lies in the artesian belt it may be possible to strike some rock which may yield an artesian supply. I saw the artesian well at Gokalnagar (Kichha) which is yielding an abundant and constant supply of water. In this case the boring had to be done to about 250 feet deep, and I think in the case of tube-wells, it will be necessary to go about 150 feet deep before we can obtain a good supply of drinking water. In order to prevent formation of pools near artesian wells stop-corks will have to be provided to the strainers, though I know that there is some prejudice against the adoption of this method for fear that the supply may fail. There appears, however, to be no valid ground for entertaining this apprehension.

Wild Animals

10. Wild animals constitute a problem for the Tarai only second in importance to malaria. Wild beasts including tigers, panthers, elephants, boars, blue bulls and many species of deer have played their own part in the continual deterioration of the tract. The greatest amount of damage is done to the villages that border the forests which mainly lie in the north. The depredations of wild animals can be greatly minimized if a belt, about half a mile deep, is kept clear of forests, between the boundary of the colony and that of the forest so as not to allow any cover to the animals coming from that direction. Extension of cultivation will bring reduction in their numbers in its own train, but the settlers coming from the ranks of ex-servicemen can also be expected to contribute their mite towards the extermination of the menace. A generous supply of fire-arm licences is clearly required. Perhaps the greatest amount of devastation is caused by the wild pigs who can burrow even underneath stone walls. It is an extremely difficult task to keep them away from cultivation, but I think a stone wall about 4½ feet high with two or three strands of barbed wire on the top and a couple of them underneath the ground will be very effective in providing sufficient protection from them. This should be reinforced by the plantation of a cactus fence behind the wall. Due to the cessation of hostilities a copious supply of barbed wire may not be a difficult affair. The first colony will lie between the Haldwani metalled road and the Dhimri, a distance of about 12 miles and I think the construction of a wall of that length should not be considered very expensive. Already walling and fencing at Government expense has been done in a total length of about 91 miles in the Tarai, and therefore an extension of 12 miles in the first important stage of development of the colony should present no difficulty. The disadvantage of the walling system is its vulnerability particularly at the site of the streams, where a sort of archway in the wall will have to be built in order to allow of the flow of water. There are some 13 such streams in

the area to be taken up for development in the first year and I propose that pill-boxes or sentinel posts may be constructed at all such vulnerable points. In each of these posts an ex-serviceman-chowkidar may be posted to shoot the animals attempting to pass through the apertures in the wall. With an 'all-clear' half-a-mile-deep belt and these sentinel posts guared well, the inroad of wild animals is bound to decrease. I do not think it will be necessary to maintain the watchmen for more than a year or so, and all this expenditure will be well spent in the interest of the colony.

Wild elephants are definitely on the increase and they are particularly bad in villages bordering on the forest. Kichha tahsil is probably the worst affected, no less than 21 villages having been deserted in this tahsil as a result of their being laid waste by the wild elephants during the past six or seven years. *Khedah* operations were once held by the Maharaja of Balrampur. The Government used to subsidize the scheme and to take a share out of the profits obtained by the sale of elephants but these operations have been abandoned and there has been no *khedah* for the last 40 years. I think this system of catching the animals should be revived and continued until the menace diminishes. Blue bulls and deer also cause damage but these animals can easily be controlled. Though not a wild animal, I should not forget to mention the monkey which is the source of not a little damage in the area. Monkeys from all over the country ware captured and let loose in this desolate area to play havoc with plantations and crops in the fields. In view of strong Hindu sentiment in regard to killing them, I do not see any way of getting rid of them unless it is by paying their captors, who let then loose in this country, in their own coin. Perhaps these animals could be transported to Rajputana deserts or some other place, where their powers of mischeif cannot be sufficiently exercised.

It may appear fanciful to co-relate the depredations of wild animals, with the incidence of malraia, but there is certainly a degree of relationship between the two. The matter has already been discussed in paragraph 3 of the report.

With a constantly diminishing population, division of labour is generally not possible and the same set of persons have to work in the day and set up a vigil at night. Tired by the day's exacting labour and having no rest at night the vitality of the people is lowered and the ominipresent pernicious malaria lays its firm hold on the enfeebled man. Many an old man pleaded before me, "save us from the wild animals and we shall be strong enough to fight the malaria." I think there is a ring of truth in this.

Malaria and Health Conditions

11. I do not think it is necessary for me to say how malarious the tract is. The area is decidedly malarial, hyperendemic to be more exact. A malarial survey of Rudrapur pargana was conducted by Rai Bahadur Dr. A. N. Dass, Assistant Director of Public Health

(Malariology) in the summer of 1943 and again in the post-monsoon period of that year. The splenic index which was 70 per cent. in the hot season was found to be cent. per cent. after the rains.

The parasite indes which was 5 per cent. in April rose to 20 per cent. in September. Existence of parasite in blood shows 'present' malaria while the splenic index shows 'recent' malaria. The dangerous types of anapheline mosquitoes were found in large number. These figures will show that the incidence of malaria is high. Disease given, the question is how to Control it. It is agreed on all hands that the opening up of the country, the clearance of forest and tall grasses will go a long way in causing a dimunition of the disease. The destruction of the wild animals is bound to cause an improvement in the vitality of the people. The draining of the water-logged places and other breeding grounds and restriction of canal irrigation will help to reduce malaria. With the invention of the deadly insecticide—the D.D.T.—and other chemicals, malaria can certainly be kept under control. There can, however, be no doubt that a permanent anti-malarial organization and the continuous employment of never-ending anti-malaria measures will be necessary to keep the disease under control. The sickness has been controlled in Mathkhera largely by the opening up of the area without the extensive employment of other methods. I also visited the Banbasa colony where malaria has been controlled, effecting noticeable improvement in the health of the people. Rai Bahadur Dr. A. N. Dass who inspected the area is of the opinion that the control of malaria "is possible only by the expenditure of large sums of money and sustained effort. The malarialogist and the engineer will have to work hand in glove to attain the desired end. A persistent long-term policy is absolutely necessary. A special resident malaria-trained staff with necessery authority to enforce its recommendations will be required." He utters a warning that the "importation of non-immune population on a large scale under the existing conditions will result in a flare up of malaria even among the local residents, and will certainly cause a havoc among the immigrants. Anti-malarial operations, housing and drainage should prepare the ground for settlers well beforehand." The Tarai development scheme must take due note of the cautions mentioned by the Assistant Director of Public Health. In this big effort, I think, the Army should also lend a helping hand. In the initial stages of development the Army should be able to provide a trained and expert anti-malarial squad to conduct necessary operations, and aircraft for spraying insecticides. Once the disease is brought under control the ordinary health staff should be able to cope with it. The expenditure of money on anti-malaria work will not have gone in vain if the tract can be populated and brought under cultivation so as to make it an important granary of the province. I need not describe the various measures that will have to be taken in order to keep the disease under control, for those steps will be taken by the expert staff if and when the time comes for it.

Forests

12. In the scheme of Tarai Development, clearance of forests forms an important item. The forests are generally of poor value, consisting mainly of scrub jungle, and the Chief Conservator of Forests is not opposed to the disforestation of the area. According to the working plan of 1934 the forest blocks which lie in the area proposed for

colonization are (1)Gangapur Pattia block (22,566 acres of which 10,087 acres fall within the colony), (2) Dhimri block (15,772 acres of which 7,772 acres fall within the colony), (3) Haripura block (6,989 acres of which 5,146 acres fall within the colony), and (4) Dalpura block (5,557 acres below the railway line, all within the colony). The northern portions of these forest blocks have been omitted from inclusion in the area of the colony as they contain the morasses formed by the belt of the springs lying in them and constitute too unhealthy a tract to be included in the colonization scheme. The Special Forest Officer of the Tarai and Bhabar Estates whom I consulted in regard to the matter was keen to retain the upper part of the Gangapur Pattia block which contained a large number of *semal* trees used for making of match sticks. By excluding a large part of the area the objection of the Special Forest Officer will also be met. In order to give an idea of the more valuable *semal* trees existing in the various forest blocks, the following information has been culled from the working plan of 1934.

Name of Forest Block	*Total area*	*Number of* semal *trees*	*Number of trees already sold*
Gangapur Pattia	22,566	21,926	12,034
Dhimri Block	15,772	6,045	..
Haripura	6,989	A few hundred.	..
Dalpura	11,930	1,042	..

To the above may be added the number of trees which must have grown up or regerminated during the interval. The more valuable trees are mostly in the areas which have been excluded and no serious loss from disforestation may be anticipated. Over a large part of the area there is practically no forest except for *dhak* and a little of *shisham, khair, haldu, rauni* and other *kukat* (inferior) trees. It was only about 40 years back that much of the Gangapur Pattia block was under cultivation. which has now been entirely converted to extensive grass lands with clusters of trees here and there particularly alongside the streams The clearance of the jungle will, therefore, not be a difficult problem. Some saws or monkey jacks which were used for the clearance of areas selected for the construction of aerodromes must now be available from the Army and can be used cheaply and effectively for the clearance of jungles. There are however complicated fuel and grazing rights and certain other concessions which can be adjusted to the satisfaction of all when the matter is taken in hand. The clearance of forests in which I also include reeds and tall grasses of various kinds will convert the whole land into one immense, open and compact block of cultivation, and will also help to clear the atmosphere and reduce humidity. The tall grasses will need periodical mowing as they grow up within a few months. The removal of these tall grasses will also remove the harbouring places for mosquitoes. The experience gained from the clearance of jungle areas at Banbasa and Mathkhera proves that the removal of forests and grasses play a very important part in making a tract healthy.

Agricultural Prospects

13. The Tarai soil is naturally fertile and owing to its inherent capabilities the out-turn is so satisfactory that it is not considered necessary to apply manure. The accumulated deposit of centuries of grass and foliage has contributed to the enrichment of the humus content of the soil. Virgin and full of organic matter as the soil is, it is anticipated that no manuring will be necessary for along time to come. Almost all the crops can be grown including rice and sugarcane which are however not to be encouraged within a certain distance of habitation sites for anti-malarial reasons. The Director of Agriculture of Rampur State, who inspected the area found the land eminently suited for all types of agriculture. The principal *rabi* crops suitable for the area are gram, barley, wheat, mustard and linseed and the *kharif* crops are sugarcane, rice, maize, *juar*, sunn-hemp, etc. Amongst fruit trees mangoes, *lichis*, banana, papaia, guavas etc., can successfully be grown.

Facts and figures gleaned from the Kesar Farm for the last year will show the immense possibilities of the land. About 55 acres were placed under wheat, giving an average of 16 maunds an acre. 550 acres were under sugarcane (221 planted, 168 first ratoon, 153—3rd ratoon and 8—4th ratoon) and the yield was 650 maunds per acre of planted cane, 400—500 maunds per acre of ratoon cane and even the 4th ratoon gave an yield of 300 maunds an acre. All these results were obtained *without irrigation*. This year gram, barley, oat, mustard (yellow and black) and peas have also been grown. Paddy was much ruined by the wild pigs but the few acres that could be saved yielded about 15 maunds an acre on the average. Results are highly satisfactory and show that the agricultural prospects are excellent. For anti-malarial reasons dry farming is strongly advocated and tube-well irrigation and canal irrigation (out of such canals that may be retained) need only be given at the time of necessity. Sugarcane in the eastern parts has splendid prospect in view of the existence of two sugar factories in close proximity. The western areas will be far removed to admit of economic transportation. Sugarcane on that side can, however, be converted into *gur* for which there is quite a good demand. If, however, the means of communications are improved, it would be possible to carry sugarcane from greater distances.

Plan of Development and Ultimate Colonization

14. The area proposed for colonization comprises 105,071 acres of which 76,509 acres are contained in revenue villages and 28,562 acres are included in the various forest blocks. The area under forests is largely composed of culturable waste and may be estimated at

three-fourths of it, i.e. 21,422 acres. The analysis of the village areas is as given below :

Name of pargana	Number of villages	Total area of villages	Cultivated area (i) Irrigated	Cultivated area (ii) Non-irrigated	Cultirable waste	Barren
1	2	3	4		5	6
Rudrapur ..	51	38,855	2,428	5,015	27,632	3,780
Gadarpur ...	52	37,654	2,550	1,999	30,258	2,847
Total ..	103	76,509	4,978	7,014	57,890	6,627
			11,992			

It would appear from the above that the area already under cultivation within the colonization zone is 11,992 acres. Leaving out the barren area of 6,627 acres, the land which can be brought under cultivation is 57,890 acres to which may be added 21,422 acres that can be taken out of the forests for cultivation, making a grand total of 79,312 acres or approximately 80,000 acres. This is the target figure to aim at in colonizing the area selected, since the displacement of the existing tenants is not contemplated except in so far as may be necessary to make areas compact by exchange of plots. In any reclamation scheme agronomical balance must be maintained between agricluture, grazing grounds and timber, fuel and fodder reserves. Ill-balanced rural economy resulting in thoughtless extension of cultivation at the cost of grazing lands and fuel reserves recoils on itself by the operation of the law of diminishing returns. The Tarai constitutes an important pasture land for that part of the country, and if the entire area is broken up for cultivation it will seriously upset the economic balance of the existing villages in those parts and those which may ultimately be founded in pursuance of the colonization scheme. What will be needed in the region is the restoration of a balanced rural economy providing each component part with its complement of cultivation, pastures and tree lands. In making proper allowance for the fuel and pasture reserves, I may, however, take into account the half mile deep belt that I have proposed along the northern length of the colony and the large forests that will be preserved beyond it. That considerable area will provide the reserves necessary for the colonies, but, in addition to them, it will also be necessary to provide some pasture lands nearer home in the villages. I think a cut of 12½ per cent. may further be made in the area available for cultivation to serve as pasture and fuel reserves, reducing the land available for actual cultivation to 70,000 acres.

The total area available for colonization is a little over one lakh of acres and it will be necessary to have a ten years plan of development so that about 10,000 acres on the average will be developed each year. In view of the great necessity for taking all precautions in a tract which has baffled development and colonization for so long, it, will be desirable to graduate the plan of colonization in three stages. Comparatively speaking the easiest and the best area for the colonization is between the Bareilly-Haldwani road and the Dhimri river comprising almost 50,000 acres. For facility of future reference, I may call this area as the " Kichha-Rudrapur Block." The improvement of this will mark the first stage of development. The following epitomises the total area of the block, and land available for agriculture therein :

1	2	3	4		5	6
			Cultivated area			
Name of block	*Number of villages*	*Total area of villages*	*Irrigated*	*Non-irrigated*	*Culturable waste*	*Barren*
Kichha-Rudrapur	51	38,855	2,428	5,015	27,632	3,780
Gangapur-Pattia Forest Block ..	Total area 10,087 of which three-fourths estimated to be fit for cultivation.				7,566	2,521
Total ..	51	48,942	2,428	5,015	35,198	6,301

The area further west is lowlying with an abundance of clayey soil and a severe incidence of malaria. This area should be taken up for development only after reviewing the efforts in the first stage of colonization, i.e. the Kichha-Rudrapur Block. The area between the Dhimri and the Baur should be taken up in two stages, one ending with the Bhakra which may be called the " Dhimri-Bhakra Block " and the other with the Baur which may be called the " Gadarpur Block " The development of the Kichha-Rudrapur Block is the most important and in this report I shall confine my estimates of expenditure to this Block alone. The estimates given in respect of it will also hold good for the other half of the tract composed of the Dhimri-Bhakra and the Gadarpur Blocks.

Co-ordination with Rampur Durbar Scheme for Colonization

15. Reclamation must proceed from living habitations towards unoccupied lands in close juxtaposition, and colonies should not be isolated from one another. This principle of reclamation is now recognized by all. There will have to be very close co-operation and co-ordination between this Government and the Rampur Durbar in the matter of reclamation as the southern boundary of the Estates march with the Rampur territory. To ensure this end, I interviewed Mr. P. F. Barrett, I.C.S., the Hon'ble Minister for Home and Revenue and also had a discussion with the Director of Agriculture, Rampur. The Durbar plan of development appears to be to develop the areas further south of Bilaspur so as to be nearer the Rampur headquarters. In the opinion of the Durbar authorities that area is more amenable to

easy development. The central town in our colony will be Rudrapur which is situated right at the southern extremity of the Estate almost on the borders of Rampur State, and it will be of advantage to both the Governments if there were an unbroken continuity of development and colonization in the two territories. Bilaspur (in Rampur territory) with extensive cultivation around it, is about 10 miles south-west of Rudrapur. If the Durbar plan were to proceed from that town northwards, towards Rudrapur, a compact and extensive stretch of land could be developed easily as a result of co-ordinated effort. As our plan of development cannot go further south of Rudrapur because of the neighbouring State territory the result would be that our southern flank would always remain exposed to wild animals. Likewise will the northern flank of the Durbar twrritory remain so exposed. I brougth this point to the notice of the Hon'ble Minister for Revenue, who saw the reasonableness thereof and promised to look into the matter from this stand-point. He indicated that the Durbar at present intended to develop the land on either side of the road about 3-4 miles further north of the existing cultivated area round about Bilaspur. From that point the limits of our territory will only be about 6 miles distant. If this area can also be taken up for development, it will be the mutual advantage of both the Governments. The extensive block of excellent cultivation round about Bilaspur affords a very convenient nucleus for developement and progress in the direction of our territory. The matter will need further negotiation with the Durbar authorities.

Lines along which Development may Proceed

16. It appears necessary to indicate the lines along which the development should proceed.

(1) The available area between the Haldwani-Bareilly road and the Baur should be colonized in three stages, depending on the experience gained from the first colony. In the first stage we should concentrate on the Kichha-Rudrapur Block, in the second on the Dhimri-Bhakra Block and in the third on the Gadarpur Block. The development of the Kichha-Rudrapur Block should spread over five years, taking up almost 10,000 acres every year. The other two blocks are expected to take another five years on the whole.

(2) The first problem to tackle is that of malaria. In this extremely important and at the same time very difficult work it is of the highest importance to invoke the assistance from Army authorities. The Army Units possess invaluable experience of fighting and controlling the sourge in the more difficult and malaria-ridden tracts of Assam and Arakan. That rich experience should be brought to bear upon the problem of tackling Malaria in Tarai. Sir Colin Garbett had informal discussions with the Adjutant General, the Quarter-Master General, the Deputy Engineer in Chief, Brig. Covell, Director, Malaria Institute of India, and the Military Accountant General and gathered the impression that all these high Army Officers welcomed the idea of using army units, after the cessation of hostilities, for the reclamation of the Tarai with the object of settling soldiers. In a country where

people have become resigned to a process of continual deterioration, it is of supreme importance, both from the psychological viewpoint to inspire faith, confidence and enthusiasm and in the interest of development itself, that an impression be created that the Government is in real earnest about the reclamation work and prepared to tackle it in a REALLY BIG way. The spraying of D. D. T. and other chemical insecticides, by means of aircraft, and taking up of anti-malarial measures on a large scale by the well-trained and experienced army units will go a long way to create that impression and to effectively control malaria. After the first treatment, a permanent anti-malaria organization must be set up to ensure continuity of measures adopted. The combined resources of the Army and our Public Health Department will be able to accelerate and ensure victory against the arch enemy—Herr Mosquito.

(3) The clearance of jungles and tall grasses should be taken up on a large scale not only to facilitate agricultural operations but also as an anti-malarial measure, and need not be confined to the territories to be colonized during any one year. In particular it will be necessary to clear up the half-mile deep belt along the northern boundary of the colony over its entire length so as to allow no cover to the wild animals. Saws and monkey jacks will be useful in felling the trees, and a sufficient supply of them should be available from the Army, now that the hostilities are over. There should be a well prepared plan even for the clearance of trees. It will not be necessary to fell each single tree now standing, as a large number of them will still be required by the settlers for domestic and other uses. Scattered and valuable trees can be allowed to exist so long as they do not make a cluster. Likewise forests along the banks of the streams to the depth of about half a furlong on either side (increasing to half a mile in the case of bigger rivers, the Dhimri, the Bhakra and the Baur) must also be left intact for the conservation of soil and for preventing erosions as also to obstruct the velocity of the streams. Tall grasses will have to be kept under control by periodical mowing for which purpose tractors can be used in their idle periods. Tall grasses facilitate breeding of mosquitoes and the Banbasa experiment has definitely proved that the continual mowing of the tall grasses exercises a very wholesome check on the breeding of mosquitoes.

(4) The opening up of the country by improving the means of communication, is also a very important item in the plan of development. The countryside should be opened up to its entire length at the very commencement of the development programme without regard to the extent of colony in a particular year. It is important that the produce of a colony should find easy market in the neighbourhood and in the main markets which is only possible if the important marts are connected by metalled roads. The section of the main Tarai road from Rudrapur to Gadarpur should be metalled in the very first year though it will be of much greater benefit to metal the road right up to Bazpur. Likewise the road from Rudrapur to Haldwani up to Tanda, and Gadarpur-Haldwani road up to Gularbhoj,

should be metalled at once as also the forest road connecting Gulabhoj, Tanda and Lalkua to allow a metalled route to Haldwani—the chief market of the area. The construction of all these roads will involve a total length of 40 miles, and will greatly facilitate and hasten the development of the entire tract. The branch roads from village to village or those giving access to the main roads can be constructed as the colonization proceeds.

(5) In order to meet the menace from the wild animals a wall constructed along the length of the northern boundary supplementing. the half-mile-deep " clear belt " is another necessity. The wall may be constructed 4½ feet high topped over with three strands of barbed wire to keep off the " jumping " animals and two strands of barbed wire underground to keep off the pigs who are clever enough to burrow through the bottom of the wall. The barbed wire should now be available in abundance from the Army. In about a dozen places where the wall has to archover a passing stream, sentinel posts should be constructed for watchmen to shoot the animals stealing through the opening. The wall should be reinforced by cactus fencing.

(6) A detailed survey should be undertaken to prepare a large scale contoured map of the whole area in order to assist alignment of roads, canals and drains and location of tube-wells. The survey should also undertake to point out the canals that interfere with the drainage of the country and to make a list of canals that may be closed altogether or utilized for drainage only. This will be particularly necessary in the Gadarpur area which is already in a depression and where the canals have accentuated water-logging.

(7) The streams will practically need no attention but it will be necessary to construct causeways at the site of fords in order to prevent the sites from becoming boggy as a result of passing traffic. The swampy ground only serves as a breeding place for mosquitoes. As an anti-malarial measure, the proposal is an important one. If the banks of a stream are breached resulting in swampy conditions near about a village site it will be necessary to brick over the banks over a certain length.

(8) The central town should be located at Rudrapur which should afford all facilities for marketing the produce of the area and for processing the same if necessary. Provision should also be made for the putting up of a dairy, oil, rice, paper and flour mills, and cottage industres. The town should be the headquarters of the anti-malarial organization and there should be a general hospital, a veterinary hospital, a high school, central workshop and administrative offices. Each village should have an area of about 4,000 acres of which 3,000 may be expected to be under cultivation. This area can be divided into 4 farms each of 750 acres, fringed with orchards, sufficiently large for the use of a tractor. The village site should be in the centre with the farms on all four sides of it. Dry farming alone is to be permitted within half mile radius of the inhabitations.

(9) Tractors should be used for breaking up the soil and for keeping the grass under control. The place is ideally suited for mechanized

farming but in the initial stages it is only the first breaking of the soil that should be done by means of tractors, subsequent ploughing being done with ordinary bullock power. Continuous mechanized farming may be experimented only in one farm to begin with.

(10) Faulty drainage should be looked into, small depressions filled in, if necessary, and a few drains constructed to take off surplus water wherever necessary.

(11) With 3,000 acres of cultivated area in a village, divided into 300 holdings grouped under 4 farms there will be 300 settlers for whom houses have to be provided—75 houses on each side of a central square with scope for future expansion for village artisans, etc. There should be rows of apartment houses—mosquito proof—with a front yard and a back yard (each 65·6′ × 30′) coinciding with the width of the house, for kitchen garden.

(12) Management to be authoritarian in the beginning, assisted by an Advisory Council of settlers, which will be merged into a full-fledged co-operative society after reclamation is complete.

Mechanized Farming

17. It is universally recognized that agricultural machinery should be used for developing the land. The question whether the subsequent ploughing in the course of regular agricultural operations, should be done by means of tractor or by ordinary bullock power is debatable. In the condition of things obtaining in India it does not appear feasible to start off with mechanized cultivation all at once, and the ideal must be reached gradually and by stages. The country is an ideal one for mechanized farming. Large farms can be laid out for collective farming as the cultivators will come from a class which is accustomed to disciplined and corporate life. Even so it appears that mechanized farming should first be experimented with only one farm in some village of the colony. If the idea catches on and the settlers are aggreeable to continued mechanized cultivation, tractor cultivation can be introduced in other farms as well, or it can be dispensed with altogether as the result of experiment may be. In the latter case the disused tractor can be used for breaking up land in other parts. Mr. Russell has prepared an excellent note on tractor farming giving an of the idea capital outlay involved and the profits to the cultivator. On a 20 acre unit the settler is assured of an annual income of Rs.1,200 a year. In paragraph 19, I have advocated a 10-acre unit which will give a settler a net return of Rs.600 a year. Mr. Maya Das, Director of Agriculture, gave his opinion in another connexion that the income per family should not be less than Rs.50 per mensem. The 10-acre unit will assure that income to him and besides that the cultivator will have his share of profits from the orchard and his truck garden, besides having facilities of grazing his cattle and obtaining fuel and timber supplies. Moreover, he is expected to engage himself in some local cottage industry and eke out extra income. I enclose a copy of Mr. Russell's note on Tractor Farming which is appended to this report as Appendix " C ".

Number of tractors required

18. The first stage of colonization contemplates development of the Kichha-Rudrapur Block in which about 35,000 acres of land (out of about 50,000 acres) can be brought under cultivation, or 7,000 acres each year. As the land will initially not be under crops it will be possible to use the tractor for a greater part of the year and it should be possible for a tractor with 50—60 H. P. to do about 800 acres each year. At this rate 9 tractors will be required for the development of the land. One tractor will be required to clear grass and forest from the belt to be kept clear along the boundary in the north. There must be one tractor in reserve, while one more will be required for experimental mechanized cultivation in one farm of 750 acres. Thus 12 tractors with their outfits will be required for the colony. As the normal life of a tractor is about 6 years, the full set of 12 tractors can be utilized over the entire period of development of the first part of the colony which forms the most important stage of colonization.

Plan of the Farms

19. The type of colony I have envisaged consists of a number of villages with a central headquarters town at Rudrapur. Each village is to comprise 4,000 acres out of which a quarter will be taken up by houses, roads, or chards, barren lands and areas left for pasture, fuel and timber. The remaining 3,000 acres would be divided into four farms of 750 acres each. I have selected a farm of this dimension having regard to the ploughing capacity of a tractor which will be used for breaking the land. Each farm will further be divided into 75 plots of 10 acres each that will represent the share of one settler. In the Tarai I consider a unit of a 10 acres to be quite sufficient for the needs of a settler who will, in addition, have pasture land for his cattle, a proportionate share in the fuel and timber reserves, an acre share in the common orchard and a small truck garden attached to his house. Mr. Russell favoured a 20-acre unit but a I think that the holding of a settler should not be very much bigger than the average holding which people in the neighbourhood possess. It does not seem advisable to set up a class of people with a standard of living very much different from that of other people in the locality. It will cereate a privileged class and lead to extravagance. The 750-acre farm will be divided into five parallel strips, each strip working on the same rotation of crops in turn. To facilitate tractor ploughing each strip will be sub-divided into 10-acre plots, representing one day's out-turn of ploughing and half a day's harrowing by a 40—60 H. P. tractor unit. The strips will be separated by cart roads and 10 acres plot in each strip by foot-paths. The dimensions of strips and plots will have to be modified to suit the configuration of the country. I am not certain if mechanized farming will be introduced in the area but in laying out our farms we should bear this in mind in determining the size of farms. It is this end in view that I have made the above suggestions. Orcharding should form an integral part of the 750-acre farm which will be laid out for field crops including sugarcane, wheat, legumes, fodders, vegetables oil-seeds and other crops that may be grown in rotation. The farm

should be surrounded on two sides or three by an orchard extending to about 75 acres so as to give each settler a share of one acre in the orchard. The fourth side should remain open and will have in front of it residential houses of the settlers. The plan of the farm will be as given below :

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A layout of the entire cultivated area in a village is contained in Appendix " D " showing the village site in the centre and the inner dry zone and the outer wet zone, as wet crops near half mile of habitation are not recommended for anti-malaria reasons.

Crop rotation

20. Mr. Russell has prepared a very careful note on crop rotation from which I reproduce the following extracts :

> " It is important that the number of strips be kept a multiple of the number of years' rotation adopted, and the plots be 20 acres each. Five have been chosen a five-year rotation, in order to accommodate two crops of sugarcane, one from sowing and one from ratoon. It might be thought that the question of crop rotation might well be left to a later date but it will readily be realized that the layout depends on the number of years' rotation adopted if cultivation is to be done in separate strips on the block system which is so very desirable. If the rotation is altered the layout of roads will have to be altered to make the number of strips equal the number of years' rotation adopted.

The following table shows how the rotation will be applied :

Strips or Plots	*1st year*		*2nd year*		*3rd year*		*4th year*		*5th year*	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1	Fallow	Wheat	Rice and other *kharif* crop.	Gram	Green manures.	Preparation.	Sugarcane.	Sugarcane.	Sugarcane.	Sugar
2	Rice and other *kharif* crop.	Gram	Green manure.	Preparation.	Sugarcane.	Sugarcane.	Sugar ratoon.	Sugar ratoon.	Fallow	Whea
3	Green manure.	Preparation.	Sugarcane.	Sugarcane.	Sugar ratoon.	Fallow	Wheat	Wheat	Rice	Gram and other *kharif* crops.
4	Sugarcane.	Sugarcane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice and other *kharif* crop.	Gram	Green manure.	Preparation.
5	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice and other *kharif* crops.	Gram	Green manure.	Preparation.	Sugarcane.	Sugarcane.

There is of course no intention of restricting the farms to the particular crops mentioned above. They have merely been chosen as suitable for this example of systematic rotation. It is possible that a single rotation will not suit the whole farm. Two or more rotations can, however, be adopted with slight modification of the layout.

It is also essential that the strips should run across the general direction of water sheds and valleys, so that all may include similar ground this making it possible to adopt the same crops in each strip in turn. ”

Mr. M. C. Corbett, Divisional Superintendent of Agriculture attached to me has also prepared a useful scheme for rotation of crops in the Tarai giving details of cost of cultivation and annual income that a settler may reasonably aspire to on the basis of crops suggested by him. The following is reproduced from his report :

> “ It has been proposed to demarcate an area of about 4,000 acres as an economic area for a single colony of soldiers. Out of this area of 4,000 acres it is persumed that a total area of approximately 1,000 acres will be taken out in the area required for the village site, orchards, grazing lands, main metalled roadways and *kachcha* roadways, between the plots, etc. Thus in all there will be approximately 3,000 acres of land available for being put under the plough and for cultivation. These 3,000 acres if allotted in 10-acre plots or 10-acre shares will mean a colony of 300 actual share holders with their families and a few necessary artisans, or in the aggregate 1,000 to 1,200 persons who will be earning their livelihood in one form or the other from the 3,000 acres of cultivation.”

Basis on which the rotation has been worked out

2. Any sequence of crops which are to be taken from the land must be such as to ensure the maintenance of those depending on the land. Those depending on the land will mean the human population as also the animal population. A colony of 300 persons will actually mean an animal population of at least 1,000 full grown animals in the form of bullocks and milch animals and we may presume that there will be at least 100 animals with calves. Besides this a herd of 200 head of milch animals will mean about 4 to 6 bulls. Hence we must make the 3,000 acres grow suffiient food grain and crops to feed and maintain a human population of 1,200 persons and an animal population of about 1,100 animals. The question of grazing lands does not arise for the animals as there will be plenty of grazing land in the forest nearby and the clear belt and allowance has already been made for the same, but concentrates in the form of grain or cakes will have to be augmented by green fodder crops both in the *kharif* and the *rabi*.

Possible rotation

3. The Tarai area can grow practically every type of crop except perhaps cotton. Under the circumstances the cash crops would be either oil-needs or sugarcane depending on the possibilties of a market. In those areas where *gur* production or a White Sugar Factory are within easy reach sugarcane would occupy the key position in the rotation

and in other cases oilseeds would hold this place. As food-grains, paddy and maize in the *kharif* and wheat or barley in the *rabi*, with a small area for the pulses both *kharif* and *rabi*. Thus the rotation would be either of the following :

Paddy	Sugarcane	Ratoons	Green Manure	Wheat
		or		
Paddy	*Lahi* or *Sarsdn*	Green Manure	..	Wheat
		or		
Paddy	Chillies Turmeric	Green Manure		Wheat

The Tarai area also has great possibilities for milk production and with it milk products. Besides, fruits orchards can be established and these have distinct possibilities. If dairy farming is resorted to on a large scale then rotation for the production of green fodder and concentrates in the form of grain must be adopted. A rotation which presents itself is :—

Maize for fodder and for grain { Oats for fodder and grain } *Guar* or *juar* } Peas.

The question of grazing does not arise as the animals will be stall fed and when dry can be deported to the grazing lands which will be available.

Discussion of the Rotations

4. Suppose we have a farm of 3,000 acres then the first rotation with sugarcane would be spread out as below:

Plot number	*Size of plot*	*Year I*		*Year II*		*Year III*		*Year IV*	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
	Acres.								
1	750	Paddy	S. Cane	S. C.	S. C.(H)	Rat.	S.C.(H)	G. M.	Wh.
2	750	S. C.	S.C.(H)	Rat.	S.C.(H)	G. M.	Wh.	Pad.	S. C.
3	750	Rat.	S.C.(H)	G. M.	Wheat	Pad.	S. C.	S. C.	S. C.
4	750	G. M.	Wheat	Pad.	S. C.	S. C.	S.C.(H)	Rat.	Rat.(H)

In abstracting this we find that from the four plots we can expect the following crops and yields in any single year :

Crops	*Kharif acreage*	*Rabi acreage*
1. Paddy	750	750 (Harvest).
2. Sugarcane (Plant)	750	..
3. Green Manure	750	..
4. Wheat	..	750
5. Sugarcane (Ratoon)	750	750 (Harvest).

Thus in any single year we can expect the crop distribution as ; paddy 750 acres, wheat 750 acres, sugarcane plant 750 acres, sugarcane ratoon 750 acres. In addition we will have to include in the cost of cultivation and make necessary allowance for 750 acres of newly planted cane.

Estimate of Expenditure and Returns

	Crop	*Area*	*Cost of cultivation*		*Return and Income*		*Balance*
		Acres.	Rs.	Rs.	Maunds	Rs.	Rs.
1.	Paddy ..	750	40	30,000	12 at Rs.6	54,000	24,000
2.	S. Cane (P)	750	100	75,000	600 at Rs.6	1,68,750	93,750
3.	S. Cane (R)	750	50	37,500	400 at As.6	1,22,500	75,000
4.	Wheat ..	750	50	37,500	15 at Rs.8	90,000	52,500
	Total ..	..	..	1,80,000	..	4,25,250	2,45,250

Less Standing Crops

			Rs.
Sugar Cane (Plant) 750 acres at Rs.80	..	..	60,000
Suugar Cane (Ratoon) 750 acres at Rs.50	..	..	37,500
Sanai (G. M.) 750 acres at Rs.15 ..	..	..	11,250
	Total	..	1,08,750

Thus from the above estimate we find that the working capital required to rent the 3,000 acre farm is approximately Rs.2,88,750 and the income is Rs.4,25,250. It may be argued that depreciation and capital has been excluded but the cost of cultivation figures have been kept rather high and this should cover the abovementioned items. On the income side no allowance has been made for the sale of straw and *bhusa* but it should be understood that this is a Tarai area and no allowance has been made for damage by wild animals and other unknown losses. Under the circumstances it may be taken that the income will be only about Rs.50 per acre which on a 10 acre basis would mean Rs.500 per year. This however would be as a bonus of a dividend to the settler from his own 3,000 acre holding. The pay of the labourers would amount to about Rs.2,00,000 at the least and we may presume that this would be earned more or less proportionately between the settler which works out to an additional income of approximately Rs.650 per annum each. Thus with such a rotation a settler can expect an income from the 3,000 acre farm of Rs.1,050 per annum.

There will be certain areas which are out of reach of sugar factories and where *gur* production may not be an economic or a desirable proposition. In these areas the rotation which is common in the tract at the present time may be continued such as mustard or wheat in the *rabi* or even chillis and turmeric and ginger in the *kharif.*

System of Farming

21. I have discussed the relative merits of individuals, co-operative and collective farming in my report on the Meerut Ganges Khadir scheme. The economic system of the Russian model is based on the

Socialist ownership of the means and instruments of production. In India, however, it has to be recognized that the cultivator is apt to regard his holding as his own property and is reluctant to merge his identity or property in the Commune. On the other hand individual effort cannot effect any remarkable improvement in the standard of cultivation as it obtains today. The best plan undert he circumstances appears to be to introduce the principles of collective-farming into co-operative farming in which the Co-operative Society of the colony could assume almost full responsibility for cultivation. In a collective farm all the principal instruments and means of production are pooled as public property—all the draught-animals, agricultural machines, seed stores, fodder, farm buildings needed for running the farm and all instruments for processing the produce of the collective farm. Mr. Russell has prepared an elaborate scheme for tractor farming on collective basis in the Tarai, a copy of which is appended to this report as Appendix " E ". It will be found highly useful in the scheme of collective farming suggested for one village farm to begin with. In order to satisfy the great bias for self-owned and self-possess property in our cultivators a compromise could be effected under which while retaining their proprietary rights over the land and animals, co-operative principles could be adopted to as great an extent as possible. Co-operative credits, Co-operative farming, Co-operative marketing, Co-operative stores, Co-operative processing are some of the main activities to be introduced. A scheme for Land Settlement Co-operative Societies has already been drafted by Sir Malcolm Darling, and can be adopted as a workable basis for co-operative administration which will be taken over as soon as the reclamation is completed.

Management

22. The development of the Kichha-Rudrapur Block will take about 5 years, 10,000 acre blocks being developed each year. The block comprises about 50,000 acres of land of which some 35,000 acres will be available for cultivation. In 35,000 acres it should be possible to have 46 farms each of 750 acres of culturable land. Each farm can be under a " Leader " chosen from amongst the settlers who can look after the ordinary management and be paid from the co-operative funds. The question of management is, however, an important one, as the scheme is both ambitious and novel and will call for expert management. The scheme embraces mechanical cultivation, dairy-farming and cottage industries, and it will be necessary to have capable managers to look after the technical side. It would be necessary, for pratical reasons, to make allowances for individualism and for the human factor and also to face the hard fact that dissensions and lack of experiene may prevent co-operative societies from successfully administering the colonies. It is, therefore, advisable to establish in the in itial stages of development, an authoritarian management under a colonization officer who would be assisted by an Advisory Committee of the settlers in managing the colonies. This Advisory Committee could later be merged into a full-pledged co-operative soiety and take over the entire management. The task of management can be entrusted to the co-operative societies afte the reclama-

tion has been fully completed. In view of the heavy Government financial commitments, it will be necessary to ensure adequate Government representation on the Body of Directors. In order that fragmentation may be avoided, the holdings must be impartiable and inalienable, except to the village community itself, and descent integral through law of primogeniture. Legislation will be required.

For the first five years of development it will be necessary to have the following staff :

(1) An Administrative Officer who may be called a Colonization Officer,

(2) A zemindari Manager, Assistant to the Colonization Officer, who will be an Agriculture Officer,

(3) A Mechanical Cultivation Engineer,

(4) Five Home Farm Superintendents, one for each block developed in a year, and

(5) A Dairy Farm Manager.

It is necessary that the above must be trained men of the right type and duly qualified for the duties they are expected to perform. After the management merges into the co-operative societies, they can utilize the services of these men as and when they may be considered necessary.

The cost of management may be put down at Rs.40,418 a year on the basis of the following estimate :

		Rs.	
1.	Colonization Officer at Rs.1,000 a month	12,000	a year
2.	Zemindari Manager at Rs.200 per month	2,400	,, ,,
3.	Mechanical Cultivation Engineer at Rs.200 per mensem ..	2,400	,, ,,
4.	Two mechanics at Rs.100 each per mensem	2,400	,, ,,
5.	Five Home Farm Superintendents at Rs.150 per mensem each	9,000	,, ,,
6.	A Dairy Farm Manager at Rs.200 per mensem ..	2,400	,, ,,
7.	A head clerk at Rs.100 per mensem	1,200	,, ,,
8.	One Accountant at Rs.80 per mensem	950	,, ,,
9.	One cashier at Rs.75 per mensem	900	,, ,,
10.	Four clerks at Rs.50 per mensem each	2,400	,, ,,
11.	Ten orderlies and peons at Rs.12 per mensem each ..	1,440	,, ,,
12.	One head gardener at Rs.50 per mensem	600	,, ,,
13.	Two gardners at Rs.20 per mensem each	480	,, ,,
14.	Two building overseers at Rs.60 per mensem each ..	1,440	,, ,,
15.	Two chowkidars at Rs.12 per mensem each	288	,, ,,
16.	One office sweeper at Rs.10 per mensem	120	,, ,,
	Total ..	40,418	,,,

Number of ex-servicemen who can be settled on the land

23. In the Kichha-Rudrapur Block, the area available for actual cultivation is 35,000 acres. At 10 acres per settler, the area is capable of taking in 3,500 ex-servicemen with their families in a period of five years. In the remaining 2 blocks up to the Bhakra and up to the Baur a further complement of 35,000 acres is available taking in as many ex-servicemen as in the Kichha-Rudrapur Block. Thus, if the entire area proposed for colonization is taken up for development

it will be possible to settle 7,000 settlers with their families in a period of 10 years. In the wake of them will come a number of villages artisans, tradesmen and others who will be also profit by the scheme

Model for Settler's Houses

24. The Tarai is characterized by its unhealthiness and dampness. In the construction of houses for settlers these two important points have to be specially borne in mind. There is also the risk from fire which is quite a common feature in the Tarai. The danger is probably enhanced by the fact that all the mud houses have thatched roofs which occasionally catch fire. During my inspection I noticed that the ordinary mud hut with a thatched roof is the most common habitation of the immigrants from the plains. But the Tharus and Buxas who build their dwelling houses on an entirely different system, possibly on account of their greater experience, attribute their immunity from fever largely to the nature of their habitation. They build their houses so as to keep off dampness. The ordinary mud walls become thoroughly saturated during rains and take a long time to dry. In the houses of the Tharus and the Buxas the walls are of wattle with a thin coating of mud to facilitate rapid drying. The most suitable type of house for the settlers will be the one consisting of *pucca* walls and a fire-proof roof. The roof may be either of a cheap type of concrete or of asbestos which should now be available from the Army or of corrugated iron sheet. These types of roofs should not be expensive. Rows of such apartment houses should be built in each village with front yards and back yards to serve as truck garden. The model plan of a village layout together with the ground plan of a house that will serve its purpose in the Tarai is given in Appendix "F". The building consists of a verandah (17′×10′) and an open space (13′×10′) in the front followed by a main living room (16′×16′) and two small store rooms (each 12′×7′×7½″) on its side with a courtyard (25′×16′) and an open verandah (25′×12′ 9″) on the back and a cattle-shed (14′×10′) and an open space of equal demensions alongside it forming the back part of the house. The open spaces are meant to provide for subsequent expansion or for threshing corn, chopping fodder or for such other purposes. The courtyard and the cattle-shed may be bounded by mud walls but the main walls have to be *pucca*, treated with slate or tar to make them damp proof. The house should be of the mousquito-proof pattern, which means that the verandah, the doors and the windows should have wire netting. It is not necessary to enclose frontage of the verandah with wire gauze as the lower half of the verandah can be protected by planks and the upper half by wire nets. The area occupied by the whole building is 65½′×31·6′. The kitchen garden in front would be 143′ long and 31·6′ broad and a garden of similar size would be at the back. In view of the comparatively narrow width of the house it is extremely difficult to provide for a bigger kitchen garden unless detached houses are constructed, each in the centre of a truck garden. But this has to be avoided for anti-malaria reasons. Centralized habitations are better controlled by anti-malaria organization and anti-malaria measures

can be more effectively undertaken than in scattered dwellings. The kitchen gardens that I have proposed can be easily tacked on to apartment houses as the width of the garden is conterminous with that of the house. The area occupied by the house and garden will be about 1/5th of an acre. In each village there will be 300 settlers so that 300 quarters will have to be constructed for them. Each quarter is expected to cost Rs.1,000. The Kichha-Rudrapur Block which will be settled by 3,500 ex-servicemen will need as many houses which will cost Rs.35,00,000 (3,500+Rs.1,000) spread over five years. This amount would be recoverable in 40 half-yearly instalments with 3 per cent. interest per annum i.e., in equated instalments of Rs.2,35,375 per annum at the rate of Rs.67-4 per house per annum or Rs.33 and odds every half year or about Rs.5-8 a month which is not much. In small colonies monthly house rents may be charged but I do not think that such a scheme will work where whole villages are to be founded. I do not think the settlers will grudge repaying the amount spread over a long term so as to enable them to repay in easy instalments.

Hospital and Anti-Malaria Organization

25. It will be necessary to have a well-equipped hospital at the headquarters town at Rudrapur with special emphasis on anti-malaria treatment. The following staff will be required :

	Rs.
(i) A doctor on Rs.200 a month	2,400
(ii) Two compounders on Rs.50 a month each	1,200
(iii) Two dressers on Rs.50 a month each	1,200
(iv) Two ward boys on Rs.50 a month each	1,200
(v) A chowkidar on Rs.12 a month	144
(vi) A cook, *kahar* and a servant on Rs.20, Rs.15 and Rs.10 per month respectively	540
(vii) Medicines Rs.500 a month	6,000
Total ..	12,684

In addition to this it will be necessary to maintain a permanent anti-malaria organization for spraying D. D. T. and other insecticides for the treatment of water surface and continual undertaking of anti-mosquite and anti-larval operations. Anti-malaria measures will include a mobile squad with power sprays operating in villages. The staff required will be :

	Rs.
(1) One anti-malaria doctor on Rs.200 per mensem ..	2,400
(2) Five malaria supervisers (malaria trained) on Rs.80 per mensem each	4,800
(3) Five mates on Rs.30 per mensem each	1,800
(4) Anti-malaria gang of 25 men at Rs.25 per month each ..	7,500
(5) Mistri on Rs.60 per mensem	720
(6) Motor driver on Rs. 60 per mensem	720
(7) Anti-malaria materials and drugs	3,000
(8) Five Motor Sprays at Rs.600 each..	3,000
(9) One motor truck	6,000
Total ..	29,940

This organization will divide itself into several parties to take such anti-malaria measures in the villages as may be necessary. I think the cost incurred on measures for the better health of the settlers should be charged to the revenues of the State rather than met from the funds of the colony, as the health of the subject should be the concern of the State.

Dairy Farming

26. The area is extremely well suited for dairy farming as an almost unlimited market for cream and butter at present exists in Bareilly, Haldwani and Naini Tal. Unlimited grazing is available and the farms will be in a position to grow the greater part of the concentrates required. There are at present several cattle stations in the Tarai forests where milch cattle are maintained to supply milk and cream. I visited one of these stations at Padrikhata which is affiliated to the Co-operative Health and Chemical Laboratory Limited, Lucknow. A supervisor is maintained on behalf of the Co-operative Society on the spot. He purchases milk and separates cream with the help of a cream separator. Fifteen or sixteen milkmen combined maintain a dock of about 200 she-buffaloes out of which 150 are adults. On the average one she-buffalo yields five seers of milk a day for 8 months and 2 seers a day for 4 months giving an annual supply of 36 maunds (240 day, + 5 seers=1,200 seers plus 120 days plus 2 seers=240 seers, making a total of 1,440 seers or 36 maunds) The Co-operative Society purchases the milk at the rate of Rs.6-4 per maund, that is, a she-buffalo gives milk of the value of (36 maunds + Rs.6-4) Rs.225. As against this the following expenses are incurred :

	Rs.	a.	ps	
(1) Grazing dues	0	12	0	a year.
(2) Salt	6	0	0	a year.
(3) *Gwala	24	0	0	a year.
(4) †Depreciation through losses	40	0	0	a year.
(5) Miscellaneous	4	0	0	a year.
Total	75	0	0	a year.
Annual profit from one she-buffalo is	225	0	0	a year.
Annual expenses on the maintenance thereof comes to	75	0	0	a year.
Net saving is equal to	150	0	0	a year.

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*One *Gwala* on Rs.30 a month is maintained over about 15 heads of cattle, which gives an average of Rs.2 per month per buffalo.

†It is estimated that one buffalo out of every five is lost every year either through natural causes or as a result of being killed by wild animals. A buffalo costs Rs.200 and 1/5th of it comes to Rs.40.

As a rule the milch cattle are not fed on grain or chaff but are only pastured. The dairying is, therefore, quite a profitable business in these parts. If a regular dairy with machinery is opened at the headquarters town with branches in the neighbouring forest areas, there are excellent prospects for dairy farming.

Mr. M. C. Corbett has submitted a note on milk production and dairy farms from which the following is reproduced :

> " Milk and milk production will be a most essential part of any activity in the Tarai and two suggestions present themselves immediately. Either each settler should be given his own cattle and permitted to dispose of his produce and provision be made

> in the farm for grazing, etc. preferably near the habitation site or the dairy farms be separate units. I would submit (1) that the dairy farms should be separate units because it will be only then that they can be made really profitable and the produce of the dairy farm be made to accommodate all the persons on the total unit and (2) profits be equally shared by the whole settlement. Although the above is my submission I am constrained to say that such a system also demands a very high degree of organization which will be difficult to achieve. If the organization of the Dairy section is not highly efficient then we must expect great difficulties and the colonists will suffer from great hardships because of the failure to deliver milk or milk products when they are most required. Under the citcumstances the indigenous system of individuals maintaining a few head of milch cows must continue and these animals may use the grazing lands in and around the homestead when in milk and the jungle land in the north of the area when dry.

There is great scope for a Co-operative Milk Union in this area and milk production can be taken up as a side line of the colonists. I would propose the following :

> Each individual should maintain his own animals in his own holding, which is attached to his house. In case he wishes to sell his milk to the Union he should take it to the Union Collection Centre which will be situated in the village itself and dispose of it there. The Union will develop the grazing lands in the jungle area and produce fodder crops there which will be sold to those selling milk to the Union and the Union will also arrange for the purchase of concentrates or the growing of the same in the lands unfit for human habitation. At each centre in the village or at convenient centres the milk will be handle in the bulk and processed if necessary for sale in distant markets.
>
> This same procedure can be utilized for the green vegetables, poultry and fruit which will be surplus in each 4,000-acre holding. "

Cottage Industries

27. The forest of the lower hills and the submontane tract yield an immense quantity of materials for ropes, cordage, twine, basket making and matting. These can form very good material for cottage industries. There is also a good scope for manufacture of woollen material on co-operative basis. Wool spinning and knitting has become a household occupation in the hills and in the lower areas and if a number of spinning wheels and hand spindles are made available, quite good an occupation in spare time can be assured. Sericulture and bee-keeping can also form a useful side industry. Poultry-farming can be encouraged with the help of the Director for Veterinary Research Institute at Izatnagar as there is quite a heavy demand for eggs and poultry during the summer season on the hills.

Amongst the larger industries a flour mill, a rice mill, an oil mill and a starch factory may be indicated to consume the farm produce, as also a saw-mill a paper mill, card-board mill and fibre board making and a plastic industry for utilizing the produce for adjoining forests lands.

Facilities for Education

28. A high school should be located at the headquarters of the colony and primary schools in each village. The costs of these should be a charge on the revenues of the State.

Subsidy to Settlers

29. As suggested in all other schemes a subsidy of Rs.500 per settler will greatly help the ex-servicemen in embarking on their colonization career.

Compensation

30. Since all the land belongs to the Government no question of acquisition arises, and as displacement of tenants is not contemplated no compensation need be given to them. There is, however, a long term lease (99 years) granted to the late Mr. Prag Narain on October 1, 1932, part of whose land falls in the area suggested for colonization. The villages covered by the lease are Gadaria bag, Rajpura, Panthpur, Nurpur, Lachampur, Cowman and Gangoli, which fall outside the area of the colony. The villages Beribhoj, Turkagauri, Padri, Mahrajpur, Hazarshripur, fall within the proposed colony. If these villages are taken away from the present lessees the question of empensation will arise. According to the terms of the lease the villages were given for the purpose of introducing " improved metods of cultivation " and " to develop the said area " but no cultivation has been done at all in these villages despite the lapse of about 14 years. As the terms of the lease have not been fulfilled, the lease is liable to concellation and no compensation is payable. The point, will need reference to the Law Officer of the Crown. A lease is also under issue to the Kesar Farm in respect of villages Kishenpur, Khurpia, Gaurikalan and a few other villages and the question of compensation may be involved. The Kesar Farm has taken the lease of these villages essentially for feeding their sugar factory at Baheri. If the settlers are required to furnish the required amount of sugarcane to the factory, the Kesar Sugar Works will probably have no objection to the exservicemen cultivating the land. If they are not agreeable to this, the grant of the lease may be withheld. Villages Briungla, Anjania and Darau are zemindari villages and the settlement of ex-soldiers will not interfere with their zamindari rights ; but formal agreement will have to be obtained from the proprietors of these villages agreeing to the settlement of ex-servicemen in their zamindari area. No question of compensation areas in this case either.

Initial Capital Outlay

31. I give estimates below of developing and colonizing the Kichha Rudrapur Block comprising a total area of about 50,000 acres of which 35,000 acres are culturable as I think it would be sufficient to give an idea of the expenditure involved in the first stage off development. The remaining two blocks together cover about as much area as the First Block, and, therefore, the extent of expenditure is likely to be the same excepting the central items of expenditure viz., the main roads, General Hospital, colony management and State buildings.

The items of expenditure may be divided into two broad heads, the Non-Repayable and Repayable.

Serial number	Particulars	Non-recurring expenditure		Recurring expenditure	Remarks
		Details	Amounts		
		(i) Non-repayable	Rs.	Rs.	
1	Construction of Roads—				
	(i) Main roads	40 miles at Rs. 30,000 per mile	12,00,000	12,000	To be maintained by the Estates.
	(ii) Branch roads ..	50 miles at Rs. 10,000 a mile ..	5,00,000	5,000	Ditto ditto.
2	Irrigation tube-wells with water courses.	80 at Rs. 10,000 each ..	8,00,000	2,000	Recurring and running expenses to be borne by the cultivator.
3	Drinking tube-wells ..	25 at Rs. 6,000 each ..	1,50,000	500	To be maintained by the Estates.
4	Improvement of existing irrigation works.	100 miles at Rs. 1,000 per mile	1,00,000	7,500	Ditto ditto.
5	Drainage works—				
	(i) Drains (General) ..	40 miles at Rs. 2,500 per mile..	1,00,000	2,000	Ditto ditto.
	(ii) Causeways at Fords ..	12 at Rs. 5,000 each ..	60,000	600	Ditto ditto.
	(iii) Town and village drains..	10 miles at Rs. 5,000 per mile..	50,000	500	Ditto ditto.
6	Fencing	13 miles at Rs. 4,000 per mile..	52,000	500	Ditto ditto.
7	Health and Anti-malaria organization—				
	(i) General Hospital ..	Buildings and Equipments ..	30,000	13,000	Ditto ditto.
	(ii) Anti-Malaria Organization	Equipment and Drugs ..	50,000	20,000	Ditto ditto.
8	Veterinary Hospital ..	Equipment and quarter for staff	15,000	3,000	Ditto ditto.
9	Clearance of jungles and development of land.	10,000 acres estimated to require heavy clearance at Rs. 100 an acre and 30,000 requiring ordinary tractor ploughing at Rs. 20 an acre.	16,00,000	46,000	The grass in the 'all clear' belt and near the streams will have to be periodically mowed as an anti-malaria measure. Hence recurring expenditure.

Serial number	Particulars	Non-recurring expenditure: Details	Non-recurring expenditure: Amounts	Recurring expenditure	Remarks
			Rs.	Rs.	
10	Tractors and implements ..	12 outfits at Rs. 25,000 each ..	3,00,000	75,000	12 drivers at Rs. 75 per mensem each and 12 cleaners at Rs. 30 per mensem charge running charges Rs. 5,000 per tractor per annum.
11	Tractor Workshop ..	..	25,000	1,000	..
12	Management	..	..	40,000	To be maintained by the Estates.
13	Estate Buildings	Staff and establishment quarters	60,000*	600	Ditto ditto.
14	Cottage Industries ..	..	1,00,000	..	To cover the initial expenses only. Maintenance and management to be borne by the concerns themselves.
15	Transport	5 trucks at Rs. 10,000 each, garages at Rs. 200 each.	51,000	5,000	Drivers at Rs. 75 each and cleaners at Rs. 30 each.
		Total ..	52,43,000	2,34,200	
		(ii) Repayable			
1	Houses for settlers ..	Rs. 3,500 at Rs. 1,000 each ..	35,00,000	..	Expenditure will be incurred from a Government loan repaid in equated instalments including 3 per cent. interest. Maintenance charges to be borne by occupants.
3	Dairy, cattle and machinery ..	..	2,50,000	..	Initial expenses. Maintenance and management to be borne by the concern itself.
		Total ..	37,50,000	..	
		GRAND TOTAL ..	89,93,000	2,34,200	

	Rs.
*Colonization Officers' house ..	10,000
Zamindari, dairy farm mechanical engineer's house	5,000 each.
24 Establishment quarters	10,000
Other office buildings	25,000

Of the estimated total non-recurring expenditure of Rs. 89,93,000, Rs. 52,43,000 are non-repayable and Rs. 37,50,000 repayable, and the recurring expenditure is estimated at Rs. 2,34,200 a year.

Estimates of retur and how far costs recoverable

32. Apart from subsidies which are proposed for every scheme of colonization the cost to Government would be about Rs. 90,00,000 or roughly a crore. The estimated income is Rs. 1,05,000 a year as land rent from 35,000 acres of culturable land in the Kichha-Rudrapur Block at an average rate of Rs. 3 per acre, and Rs. 2,35,375 from houses in equated instalments, and about Rs. 1,00,000 a year from the dairy. In addition there will be rents payable by existing tenants in 7,443 acres.

Summary

33. (1) The area selected for colonization lies between the Kathgodam metalled road in the east, the Baur in the west, the Rampur State territory and Bareilly District in the south and a line in the north about 4 miles short of the Lalkua-Kashipur railway line up to Rudrapur-Haldwani road, thence about 2½ miles short up to Gadarpur-Haldwani road and thereafter the railway line forms the boundary up to the Baur.

(2) The area selected for colonization lies in 103 villages and some forest blocks comprising an aggregate area of 105,071 acres. The belt of springs ' comprising the morasses in the north has been avoided. The Tarai is of a most intricate nature, characterized by its large *Savannahs* of tall grasses and reeds and patches of poor forest harbouring wild animals. The whole area is malaria ridden but the central block is comparatively healthier.

(3) The magnitude of the problem is represented by the unhealthiness of the tract, depredation of wild animals, depressing climate, bad communications and unscientific alignment of canals leading to water-logging. Problems examined with a view to give a bird's eye view of the task involved in development. necessitating the adoption of a bold policy for tackling the problem in a BIG WAY.

(4) Sir William Stampe's report examined. Ill-drainage consi. dered by him to be the cause of unhealthiness of the whole Tarai· Does **not** present a serious problem in the central parts of the Tarai selected for colonization.

(5) The natural drainage system is favourable to the draining of surplus water. The slope is gentle.

(6) Haldwani is the chief market for the area. Means of communication poor. Metalling of roads suggested as a pre-requisite to development.

(7) Rainfall, more than sufficient.

(8) Artificial irrigation unnecessary in view of the inherent moisture in the soils. Tube-well irrigation preferred to canal irrigation for anti-malarial reasons.

(9) Tube-wells necessary to provide water for human consumption. Surface water injurious to health.

(10) The place abounds with wild animals. Wall fencing with sentinel posts at vulnerable points suggested for keeping off the

animals. Half a mile deep belt, free of all trees and grass, suggested so as not to provide cover to wild animals. *Khedah* operations advocated for wild elephants.

(11) The area is hyperendemic. Suggestions for improvement in health conditions made.

(12) Forests generally of inferior kind with large waste lands towards the south. Clearance of forests in the southern portions suggested.

(13) Agricultural prospects excellent in view of the natural fertility of the soils.

(14) Plan of development : Total area available for colonization between the Bareilly-Haldwani road and the Baur over a lakh, of which 70,000 acres estimated to be available for new cultivation. The entire area to be developed in three stages. Colonization to commence from the Kichha-Rudrapur block. The Dhimri-Bhakra and the Gadarpur blocks to be colonized after reviewing the result of efforts made in the first block. Total development to be spread over 10 years and of the first block (Kichha-Rudrapur) over 5 years. This block comprises an area of about 50,000 acres of which over 35,000 acres are available for new cultivation.

(15) Reclamation to be done in close co-operation and co-ordination with the Rampur Durbar, territories of which lie in close proximity.

(16) Lines along which development may proceed indicated :

> (i) Development to be in three stages, (ii) malaria to be controlled, (iii) jungle and tall grasses to be cleared, (iv) main roads to be metalled, (v) wall fencing to be constructed as a preventive against wild animals, (vi) detailed contour survey suggested, (vii) causeways to be constructed at fords and breaches in the banks of streams near habitation to be bricked over, (viii) central headquarters town at Rudrapur, (ix) tractors to be used for development of land, (x) drainage channels to be constructed, (xi) village to be laid out according to plan and (xii) management to be authoritarian in the beginning merging later into a Co-operative Union.

(17) Mechanized cultivation, an ideal to be reached by stages. Collective farming to be experimented with one farm only,

(18) Twelve tractors required for the first stage of development.

(19) Plan of the farms suggested. In the cultivated portion of a village there should be 4 farms of 750 acres each, divided into 5 strips, each strip containing 75 plots of 10 acres each. The farm to be fringed with an orchard.

(20) Crop rotations suggested.

(21) Cultivation on a co-operative basis suggested.

(22) Management to be authoritarian in the initial stages yielding to a Land Co-operative Society after reclamation is completed.

(23) Possibilities of settling 7,000 settlers in the entire area suggested for colonization, and 3,500 in the Kichha-Rudrapur block in the first stage of development.

(24) Model plan for a village layout and a ground plan for settlers' houses indicated.

(25) Establishment of a hopsital and anti-malaria organization suggested.

(26) The tract is ideally suited for dairy farming.

(27) Cottage industries described.

(28) Facilities for education to be provided.

(29) Subsidy of Rs. 500 per settler suggested.

(30) Question of compensation to zamindars and long leaseholders discussed.

(31) Initial capital outlay examined under two heads—Repayable and Non-Repayable—Rs. 37,50,000 under the former and Rs. 52,43,000 under the latter making a total of Rs. 89,93,000. Annual recurring expenditure estimated at Rs. 2,34,200.

(32) Apart from subsidies, total expenditure estimated at about Rs. 90,00,000 in the first stage of development leading to the establishment of a colony of about 50,000 acres. Estimated income is :

(i) Rs. 1,05,000 a year as land rent,

(ii) Rs. 2,35,375 a year in equated instalments from houses constructed for settlers,

(iii) about Rs. 1,00,000 a year from Dairy, and

(iv) rents from existing tenants as usual.

APPENDIX 'B'

Extract from the soldiers' settlement scheme in the Tarai and Bhabar Government Estates prepared by MR. J. W. RUSSELL, I.S.E.

* * * * * * *

"I strongly advocate the use of tube-wells for irrigation (when necessary) in the northern parts of the block, not only because the supplies in the streams are small, and while proving inadequate for the needs of whole of that tract, will, if tapped there, reduce supplies available for the areas lower down ; but because whereas canal irrigation often results in water-logging, pumping from the sub-soil will counteract it. Furthermore the sub-soil source of supply is so close to the surface (this Tarai belt actually yields artesian wells already in existence) that pumping would be both easy and cheap. For source of power we could utilize either small diesel engines or electricity, if that is provided as part of the industrial portion of the scheme."

Extracts from D.-O. no. 43/*C*, *dated May* 24/27, 1943, *from the Superintendent, Tarai and Bhabar Government Estates, Naini Tal, to* SIR COLIN GARBETT, K.C.I.E., C.S.I., C.M.G., *c/o Assistant Secretary, Defence Department, New Delhi.*

"I know that irrigation will not be required to any great extent (in the Tarai) and in fact I want to discourage it. At the same time I realize that certain crops (sugarcane, and rice for instance) may require to be irrigated occasionally, and that other crops should have a safeguard against drought. The question is how to provide a cheap source of irrigation to the tenant consistent with the limitations of demand for irrigation and our anti-malarial aims. I believe that tube-wells meet these objects best. The source of supply is then ready to be tapped anytime at will, but lying beneath the surface doing no harm when not required ; they require very little maintenance, especially when not in use, and running costs will accrue only for the period they are actually used. For source of power I proposed diesel engines, but I have also in mind the possibility of using out tractor engines, by means of a power take off, which these machines are usually provided with. This will overcome the expense of extra drivers, though in any case some of the tenants themselves can be trained for this purpose. We have got to make them feel that they are responsible for managing their own irrigation.

Now let us consider the financial implications. Assume for convenience a farm of 1,000 acres which had its own tube-well. Even if it had no need to irrigate an acre of its land in any particular year it would only have to bear the depreciation on its well and engines, which would only amount to about Rs. 500. If in an average year it had to give half its sugarcane area of 400 acres one watering and its whole rice area of 100 acres one watering, this would cost it 200 × 2/8/0 equal to 750 in addition to depreciation. In an abnormal year assume it had to irrigate three times that area. the cost would be Rs. 2,250.

Now turn to a farm having all the conditions for a profitable Irrigation Department tube-well. On 1,000 acres command, it would be expected to irrigate about 200 acres of sugarcane, 200 of rice and 200 *rabi* crops. Irrigation charges would be approximately as follows :

	Rs.
200 acres ot sugarcane at Rs. 12	2,400
200 acres of rice at Rs. 6	1,200
200 acres of *rabi* at Rs. 5	1,000
Total	4,600

I think you will agree that from our tenants' point of view our proposal to instal what we might term 'protective' tube-wells is not at all unsatisfactory, though they would be hopelessly 'unproductive' from the Irrigation Department point of view.

Coming next to the source of power, I think it is apparent that any electric power station, whether hydro or stream, would find our tube-wells wholly unproductive consumers. Separate diesel engines appear to suit our requirements best; though, as I have already mentioned, the possibility of using our tractor engines should be kept in mind. This would save in initial cost and provide work for the tractors during idle periods.

I agree about taking up tobacco, but not for the purpose of providing another crop to irrigate. Small quantities of tobacco are grown in the eastern parts of the tarai, but without irrigation I would like to try out some improved varieties next winter. Could you get me some seed of varieties in demand for cigarette making.

Lastly, I take up the size of the farms, I have made a map of proposed 765-acre farms. You will see from the map that in most cases the farms in the Estates area have to extend across streams. This complicates the question of tube-well. We will not in most cases be able to have a separate tube-well for each farm, but will have to locate them to suit natural commands. This will mean two or more farms sharing the same well. Larger farms as proposed by you will complicate matters more. It is also going to be almost impossible in most cases to keep to the ½ mile dry crop belt around villages. Conditions lend themselves better to this in the Rampur State. However, until I have a large scale detailed survey plan, I am unable to come to any definite decision about this."

APPENDIX C

SUPPLEMENTARY NOTE ON TRACTOR FARMING FOR THE SMALL TENANT

1. This note explains how the productive power of the cultivator can be increased by affording him the use of tractors with uptodate farming implements ; and also how the provision of these machines can be financed. The idea put forward is farming with a combination of tractors and bullock ploughs, the former doing the heavy work of deep ploughing, horrowing etc., and the latter the lighter operations such as sowing, inter-culture, weeding etc., obviously the cultivator or even a group of them could not be expected to purchase and run a tractor unit. These will therefore be provided by the Estates and a charge made per acre for ploughing and harrowing actually done. The cultivator would, however, own and work his own bullock and perform the other labour operations required.

2. The following figures show to what extent the earning power of the cultivator will be increased. As a general rule tenant with one plough has a holding of 5 acres ; but an energetic good cultivator may manage a holding of about 10 acres including sugarcane in addition to the usual Rabi and Kharif crops. A tractor and 12 bullock ploughs can manage at least 500 acres of cultivation and generally much more. Thus the minimum area per plough with tractor would be 40 acres as compared with a maximum of 10 acres without tractor. Not only is the area per plough 4 times as great, but the yield from tractor ploughed lands wtih better farming methods will be greater so that the total value of crops may be 5 times.

These proposals, however, aim at allotting only 20 acres per plough, as this area should suffice to give a cultivator a very good livelihood.

3. Assuming that the rotation of crops mentioned in paragraph of the report is adopted, each holding will produce the following crops in one plot every year :—

1 crop of sugarcane,

1 crop of sugarcane ratoon,

1 crop of rice (or maize etc.,)

1 crop of wheat,

1 crop of gram.

assuming reasonable yields and prices the following would be the return per plough to the tenant in each of the two cases, i.e. (1) working 10 acres with bullock plough alone and (2) working 20 acres with the aid of tractors.

(1) *Bullock plough alone*

5 plots of 2 acre each

Crop	Yield per acre	Yield in 2 acres	Rate per maund			Value	Remarks
			Rs.	a.	p.	Rs.	
Sugarcane ..	300	600	0	6	0	225	It is assumed that all the labour will be provided by the cultivator and his family and that no extra labour will be hired.
Sugarcane ratoon.	200	400	0	6	0	150	
Rice ..	12	24	4	0	0	96	
Wheat ..	12	24	4	0	0	96	
Gram ..	10	20	3	0	0	60	
Total value	..	..	..			627	

(2) *Bullock plough and Tractor*

Crop	Yield per acre	Yield in 2 acres	Rate per maund			Value	Remarks
			Rs.	a.	p.	Rs.	
Sugarcane ..	450	1,300	0	6	0	675	As the quantities to be harvested are great, it is persumed that some extra labour will have hired.
Sugarcane Ratoon.	300	1,200	0	6	0	450	
Rice ..	15	60	4	0	0	240	
Wheat ..	15	60	4	0	0	240	
Gram ..	12	48	3	0	0	144	
		Total	..			1,749	

Deduct :—

(1) Cost of tractor ploughing :—	Rs.
(a) 1 deep ploughings 4 acres at Rs. 12 per acre ..	48
(b) 8 harrowings 4 acres each at Rs. 6 per acre ..	192
(2) Cost of special manure etc.	50
(3) Cost of extra labour for harvesting :—	
(a) Sugarcane 3,000 mds. at Rs, 1 per maund ..	188
(b) Other crops 168 maunds at annas 2 per maund ..	21
Total deductions	499
Net return	1,250

The above represent the probable return to the tenant for his own and his familyis labour per plough in each case. The figures are not absolute, as there are many varying factors, such as yields, prices, labour, wages, etc. They, however, not only serve for comparison but represent reasonable expectations. From these earnings he of course, has to meet all his expenses, such as rent, maintenance of plough and carts, etc. In both cases his expenses will be similar so that it is obvious to what extent he will be better off if helped by tractors.

(4) The following represents approximate costs for a single tractor with implements. The prices are those which obtained two years ago. It is impossible to forecasts what they may be later.

Capital outlay

	Rs.
Tractor	20,000
Implements :—	
Disc. plough	4,000
Disc. hallow	4,000
Miscellaneous	2,000
Total	30,000

Depreciation taking life at 7200 working hours.
20000/7200— 4·1/6 per hour.
Depreciation per year for—
1200 hours=4·1/6×1200=Rs. 5,000.

Working expenses—

Staff	Rs.
1 Driver at Rs, 50 per mensem ..	50
1 Assistant and cleaner at Rs. 30 per mensem ..	30
2 coolies at Rs. 15 per monsem	30
Total per month	110
Total per year	110×12=1,320

	Rs.
Fuel oil 3 gallons per hour for 1200 hours=3600 gallons at Rs.3 per gallon	=1,800
Lubricating oils 1/50th gallons per hour for 1200 hours= =25 gallons at Rs.4 per gallon	=100
Grease 4 annas per hour for 1200 hours	=300
Miscellanoous 1 anna per hour for 1200 hours ..	75
Spare part 1/3 of depreciation chargos	=1,667
Annual overhaul lump sum	500
Total annual expenditure including depreciation ..	10,762
Say ..	10,800
Expenditure per acre=Rs.10,80/900	12

Taking the number of working days in a year an 150 as each of 8 hours, the total working hours for the tractor will be 1200 per year. On the assumed rotation each plot requires 1 deep ploughing and 8 harrowing every five years. Assuming a ploughing to take twice as long as a harrowing, this would be equivalent to 10 harrowings. A tractor of the size contemplated can harrow 1¼ acres per hour. Therefore, the number of acres which can be worked in a year would be :

1200×5/10×1½=900 acres.

Actual working days may be increased so that the tractor could cope with over 1,000 acres. But 900 has been accepted for working out costs, etc., to be on the safe side. Also by increasing the actual number of working hours to 180, 20 per cent. of the total would allot one tractor for each 1,000 acre farm and have 1 in reserve for every 4 or 5 years.

5. The rates to be charged for ploughing and harrowing been worked out as follows. The cost per working hour have been taken and these have been converted into rates per acre.

	Depreciation	Spares	Labour	Fuel and labour	Annual over-haul	Total hour	Rates per acre
							Rs.
(1) Deep ploughing in ½ acres per hour.	4 .17	1 .39	1 .1	1 .9	0 .42	8 .98	12
(2) Harrowing 1½ acres per hour.	4 .17	1 .39	1 .1	1 .9	0 .32	8 .98	6

I have been conservative in my estimate of working capacity. Makers as much as 1 acre per hour ploughing and 1¼ per hour harrowing and even more.

The expenditure incurred on tractor ploughing would be recovered from the farms at the above rates. The annual recoveries would be as follows :

	Rs.
180 acres deep ploughing at Rs.12	=2,160
1440 acres harrowing at Rs.6	=8,640
Total ..	10,800

6. It will be noticed that the rates chargeable include depreciation so that the whole capital outlay would be recovered in six years, if the tractors work to full capacity from the start interest on the initial expenditure has not been taken into account as the tenant may be given the benefit of this concession. As I have taken the life of equipment as only 7,200 working hours, against a minimum of 8,000 and often much more taken by manufactures it, is likely, however, that the Estates would recover more than its interest charges in the seventh and subsequent years of working.

7. Each tractor unit would entail an initial outlay of Rs.30,000. As the life of the plant has been taken as six years replacement of complete units would commence from the 7th year. So there would be a recurring expenditure of Rs.30,000 on each tractor every six years. But recoveries for depreciation would be taken place at the rate of Rs. 5,000 per tractor every year. If one out of every six tractors were replaced every year the annual expenditure on replacement would be Rs.30,000 but the annual recoveries would be 6×6,000 which is Rs.30,000 also. The account of a expenditure and recoveries for six tractors from the first year onwards is shown in the attached state-

ment. This shows clearly how the expenditure is completely liquidated. The cost of every tractor is recovered in full in six years, and even the annual outlay and recoveries balance. If in actual experience the average life of the tractors may be found to differ from that accepted in this note, this will simply require modification of the figures to balance expenditure and recoveries within the actual term of life.

8. As each tenant's holding will be 20 acres, each plot for five years rotation would be 1/5 of 20 i.e., 4 acres only. This is not a suitable size for efficient tractor work. As minimum of 20 acres is desirable, so some sort of collectivization will therefore be necessary. I am in favour of a complete collective system. Besides the above, there are several reasons for this. In the first place it is essential to retain each farm as a unit and work the rotation of crops in strips or blocks. If we allow individual holdings it would easily result in individuals deviating from the plan, and throwing the whole scheme out of gear.

Furthermore, individuals would have a right to relinquish part of their land, which might result in some being left with uneconomic holdings and others with too much. Then again there will be different classes of soil, some of which may be inferior or suitable only for particular crops. Individual holdings may result in some gaining advantage over others, whereas collectively all would share proportionately to the labour each puts in. Collective cropping has been suggested by some as an alternative, but it does not remove or overcome these objections. Unless the farm is worked as one unit to a single plan and policy the very foundation of the scheme would be unsound. We have to guard against its disintegration into a number of separate units, and that can only be done by refusing individuals the right to any particular plots. They must only be allowed, to be shareholders or part owners of the whole.

J. W. RUSSALL.

Account of expenditure and recoveries tractors

Year	1st tractor		2nd tractor		3rd tractor		4th tractor		5th tractor		6th tractor		Total	
	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	30,000	5,800	..	..	..	..	..	..	..	..	..	..	30,000	5,800
2nd	..	5,800	30,000	5,800	..	..	..	..	..	..	..	..	30,000	11,600
3rd	..	5,800	..	5,800	30,000	5,800	..	..	..	..	..	..	30,000	17,400
4th	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	..	..	30,000	23,200
5th	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	30,000	29,000
6th	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	30,000	34,800
7th	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
8th	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
9th	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
10th	..	5,800	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	30,000	34,800
11	..	5,800	..	5,800	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	30,000	34,800

Year	Recoveries													
	1st tractor		2nd tractor		3rd tractor		4th tractor		5th tractor		6th tractor		Total	
	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation.	Working	Depreciation	Working
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	5,000	5,800	..	..	..	..	..	..	..	..	..	..	5,000	5,800
2nd	5,000	5,800	5,000	5,800	..	..	..	..	..	..	..	..	10,000	11,600
3rd	5,000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	..	..	15,000	17,400
4th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	20,000	23,200
5th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	..	..	25,000	29,000
6th	5,000	5,800	5,000	5,800	5,000	5,000	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
	30,000													
7th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
			30,000											
8th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
					30,000									
9th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
							30,000							
10th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
									30,000					
11th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
											30,000			

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APPENDIX E

A scheme for tractor farming on collective basis in the Tarai and Bhabar Government Estates, Naini Tal

By J. W, RUSSELL, Esq., I.S.E,

This note embodies a scheme to develop the Estates by means of tractor farming. The following remarks apply particularly to the Tarai area but they are also applicable to some portions of the Bhabar where similar conditions prevail. Although, therefore, the Tarai may be particularly meetioned these portions of the Bhabar should be considered as included.

2. There is no shortage of land in the Tarai, but cultivation is sparse and undeveloped. The main cause is the notorious humid and enervating climate and the prevalance of that life sapping disease malaria. The population is small and both man and beast are incapable of sustained effort.

3. Except for a few large farms where the proprietors have introduced tractor farming, man and bullock power are the usual means of cultivation. The total area of cultivation possible is, therefore, limited by the number of ploughs, which is itself limited by the man power available.

4. Attempts to increase the man-power by settling new tenants from other parts have not been successful. Inhabitants of other districts or provinces are unable to stand up to the climate of the Tarai, and sooner or later, either leave or die. Development of the Estates has in consequence not progressed. Any future scheme of development must, therefore, not rely entirely on new tenants, though results may induce new settlers to come in.

5. To have a chance of success development must aim at improving the economic condition of the tenant and this can only really be done by increasing his earning power. The first aim of rural development should be to enable the tenant to earn more. How can the poor tenant, depending on a pair of bullocks and a plough, live better, eat better food, clothe himself properly and protect his health and physique. All this means more expenditure. Before he can raise his standard of living he must be able to earn more. This in my opinion is the crux of the problem of rural development. Solve it, and the rest will follow. So long as each tenant has to depend solely on himself and his two bullocks for production, his earning power is restricted. Increase in population and bullocks may increase the area under cultivation, but not the earning power perindividual. Even were the settlement of new tenants possible, the economic condition of the tenant would not be improved. There would therefore be no inducement for new settlers nor any improvement in the condition of the present tenantry.

6. Although the vast areas of barren land remaining in the Estates have been a source of great disappointment they now make it possible to introduce without difficulty a scheme of development, which would achieve this object. There is no dearth of land for the expansion of cultivation, so there is no difficulty in the cultivator producing more by expansion of his cultivation if he had the power to do so. The only difficulty is the means by which he may be enabled to do so. Each

man and his plough must be made to produce many times what he does at present, without introducing more men to share it. This is made possible by the use of tractors. A single moderate sized tractor could replace 100 bullock ploughs, or such a tractor with 20 ploughs, working in conjunction could increase the area of cultivation four to five times. Here then is the solution both for improving the economic condition of the tenant and increasing the cultivation in the Estates. The present tenantry could bring practically all the culturable land at present lying barren back to cultivation, and in so doing make themselves prosperous. The other consequences would be the possibility of better housing, clothing and food, all resulting in an improvement in the physique and health of the population, and drop in mortality. Tractor farming could be introduced in two ways. For the poorer tenant collective farms would be the most suitable, while for the better class of tenant, desiring and capable of managing them, private forms could be arranged.

7. The proposed scheme envisages a combination o^f work by tractors as well as bullock ploughs. The initial heavy ploughing and harrowing would be done by tractors and the sowing and other light operations such as weeding, and interculture were required, by bullock plough.

8. The object of collective farms is to enable the small tenant to take advantage of the scheme. It would obviously be impractical to use tractors to work their scattered small plots. Consolidation of holdings also present many difficulties, and even if these could be achieved, farming of a number of separate holdings would be less efficientt than one or two large collective farms. As a general rule, therefore, tractor ploughing would be undertaken only on individual holdings of more than 50 acres in a single compact block, with a satisfactory rotation of crops.

9. The collective scheme would permit of tenants still continuing to cultivate their own separate holdings. i.e. they would devote only part of their time to the farm and part to their separate holdings.

As time goes on it is likely that these farms will expand at the expense of the individual holdings, and the ultimate objective is to get almost the whole area worked on a collective basis, leaving only a few small plots adjoining the village habitation to be worked individually for special crops such as vegetable, tobacco, potatoes, etc.

10. As the scheme aims at increased cultivation per plough unit and increased earnings, comparative figures of these will now be dealt with.

In the first place let us consider the areas which can be worked. A single bullock plough can cultivate about 6 acres per year. Twenty ploughs could manage 120 acres. With a combination of tractors and bullocks on the lines contemplated, the same 20 ploughs could deal with an area of 600 acres, or possibly more depending on the crop rotation adopted. In terms of produce, therefore each owner of a piough could earn 5 times the quantity as before, without taking into account the increased yields consequent on deeper ploughing and better methods of agriculture. If this were taken as 20 per cent. which actual experience has shown can be reasonably expected, his return will be 6 times. This would represent gross return. The net return would be obtained by deducting what he would have to pay for the tractor ploughing, manures, etc. used.

To work out the net returns is however, a little compliacted. The total size of holding per plough would be greater than the area actually under crops. This would depend on the crop rotation adopted. Before wecan estimate returns, therefore, one must decide on a crop rotation For this purpose I will adopt the following as it is admirably suitable for the Tarai areas, and is what we are trying to encourage at present.

	1st year		2nd year		3rd year		4th year		5th year	
Plots	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
1	Fallow	Wheat	Rice	Gram	Green manure	Preparation.	Sugarcane	Sugarcane.	Sugar ratoon.	Sugar ratoon.
2	Rice ..	Gram	Green-manure.	Preparation.	Sugarcane.	Sugarcane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat.
3	Green manure.	Preparation.	Sugarcane.	Sugarcane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice ..	Gram.
4	Sugarcane.	Sugarcane.	Sugar ratoon.	Sugar ratoon.	Fallow	Wheat	Rice ..	Gram	Green manure.	Preparation.
5	Sugar ratoon.	Sugar-ratoon.	Fallow	Wheat	Rice ..	Gram	Green manure	Preparation.	Sugar	Sugar.

Working on this rotation the following are the areas workable by a bullock plough alone, and by plough with tractor respectively.

	Total holding	Area of each plot
A single bullock plough only ..	10 acres ..	2 acres.
A single bullock plough helped with tracctor ploughing.	50 ,,	10 ,,

Each holding will produce the following crops in one plot every year :

One crop of sugarcane.
One crop of sugar ratoon.
One crop of rice.
One crop of wheat.
One crop of gram.

Taking average yields and prices, the following would represent the tenants return per plough in each of the above two cases.

(*I*)—*Bullock plough alone*

(5 plots of 2 acres each)

Crop	Yield per acre	Yield in 2 acres	Rate per maund			Value		
	Mds.	Mds.	Rs.	a.	p.	Rs.	a.	p.
Sugarcane	300	600	0	6	0	225	0	0
Sugarcane ratoon	200	400	0	6	0	150	0	0
Rice	16	32	4	0	0	128	0	0
Wheat	12	24	4	0	0	96	0	0
Gram	12	24	3	0	0	72	0	0
		Total			..	671	0	0

Note.—It is assumed that all the labour required in the above operations is supplied by the tenant and his family. The value of the product is their return for that labour.

II—Bullock plough and tractor

(5 plots of 10 acres each)

Crop	Yield per acre	Yield in 10 acres	Rate per maund			Value		
	Mds.	Mds.	Rs.	a.	p.	Rs.	a.	p.
Sugarcane	450	4,500	0	6	0	1,687	0	0
Sugarcane ratoon	300	3,000	0	6	0	1,125	0	0
Rice	20	200	4	0	0	800	0	0
Wheat	15	150	4	0	0	600	0	0
Gram	15	150	3	0	0	450	0	0
			Total		..	4,662	0	0

Deduct—

	Rs.
(1) Cost of tractor ploughing—	
(*a*) 1 deep ploughing at Rs.12 per acre = 1 × 10 × 12 ..	120
(*b*) 8 harrowings at Rs.6 per acre = 8 × 10 × 6 ..	480
(2) Cost of manures etc.=L.S.	50
(3) Cost of extra labour for harvesting—	
(*a*) Sugarcane 7,500 mds. at anna 1	469
(*b*) Other crops 500 mds. at annas 2	62
Total ..	1,181
Net return ..	3,481

11. The above represent the returns to the tenant for his own and his families labour per plough. These figures are not absolute. Yields will vary, prices will vary, and even the number of bullock ploughs required to work farms of equal areas may vary. They, however, represent a real possibility, and serve to show the extent to which the production earnings per plough can be increased by the use of tractors. The figures apply equally to collective as well as private farms.

12. As, however, the tenants is expected to carry on some private cultivation, he will not place himself and his bullocks entirely at the disposal of the farm. It would be fairly safe to assume that half his time would ultimately be devoted to the farm so his annual return would amount to about Rs.1,700 from the farm and Rs.300 from private cultivation. To start with, however, I do not propose allotting such a large area per plough. I have no doubt that a plough could cope with the sowings, but there may be some difficulty about harvesting owing to dearth of labour. It would be best, therefore, to increase the area per plough gradually in the light of actual exprience as to what can be satisfactorily managed.

13. The private farm presents no particular difficulties. The owner will manage his farm, and own or employ the required number of ploughs and labour. He will pay for the tractor ploughing and harrowing, and arange for the other operations himelf. The whole produce of the farm will be his. But his earnings per plough will be less as he will need to hire more labour than in collective farms, where the tenants themselves will work.

14. The procedure on collective farms will not be so simple. As the farms will be worked collectively by several individuals, the produce has to be shared. But each individual may not be able to perform an equal share of the work, so the outturn cannot be shared equally, but will have to be shared in proportion to the labour put in.

15. Collective farms will, therefore, be run on the following lines :

(1) Each fanm will consist of a compact area of 100 acres or more.

(2) The farm will be divided into five equal strips or plots.

(3) Each of the strips or plots will follow the same rotation of crops in turn.

(4) The management will be in the hands of the padhan assisted by two members who will form the managing committee.

(5) All members will be liable to supply a bullock plough with ploughman for work on the farm when required.

(6) All members will also be liable to supply their own personal labour or that available in their own families when required.

(7) The basic unit of work will be a 'plough-day', i.e. one plough working for one day of 8 hours.

(8) The subsidiary unit of work will be the 'man-day' i.e. one man working for one day of 8 hours. three man-days will be taken as equivalent to 1 plough-day.

(9) Each member supplying either a plough or manual labour will have his attendance written up daily on an attendance card which will be kept by him and also on a muster roll maintained by the managing committee. These two labour accounts must be checked and balanced at the end of every month. Separate muster rolls will be kept for each crop.

(10) In order to avoid the necessity for capital, as much as possible of the payments will be deferred till the crops are harvested and sold. Such cash payments as are necessary will be met at first by loan till a working fund has been accumulated. A daily account of expenditure will be maintained by the committee.

(11) The farm will be member of the cane marketing, grain marketing co-operative societies of the area in which it is situated.

(12) The accounts will be balanced at the end of each *fasl*, and the earnings divided among the members in proportion to the numbers of plough days supplied by each.

(13) The total number of ploughs to be submitted should not be less than one per 25 acres of farm of more than 1 per 6¼ acres. It would be best for each farm to start with about 16 ploughs per 100 acres and to expand by increasing the area per plough gradually to the fullest extent found manageable.

(14) Ordinarily one tenant should only be allowed one plough but this may be increased to two if the number of members available is insufficient.

16. The tractor operations for the rotation already selected would be as follows :

(1) Harrowing for rice—once—from February to March.

(2) Harrowing for green manure—once from 15th May to 15th June.

(3) Preparation for wheat—twice—from 1st August to 30th September.

(4) Deep ploughing after green manure—once—from 15th August to 15th September.

(5) Harrowing for wheat—once—from 15th September to 15th October.

(6) Harrowing for gram—once—from 1st October to 15th November.

(7) Harrowing for sugarcane—twice—from December to January.

17. Sowing operations by bullocks will follow immediately after the tractor work in each case. The periods of sowing are shown below :

(1) Rice, from 15th June to 31st July.
(2) Green manure, from 1st to 15th July.
(3) Wheat, from 15th October to 15th November.
(4) Gram, from 1st November to 15th December.
(8) Sugarcane, from 1st March to 30th April.

18. Taking the number of working days in a year as 150 each of 8 hours, the total working hours for the tractor will be 1,200 per year. On the assumed rotation each plot requires 1 deep ploughing and 8 harrowings every five years. Assuming a ploughing to take twice as long as a harrowing, this would be equivalent to 10 harrowings. A tractor of the size contemplated can harrow 1½ acres per hour. Therefore, the number of acres which can be worked in a year would be :

$$1200 \times 5/10 \times 1\tfrac{1}{2} = 900 \text{ acres.}$$

This would be divided into a number of separate farms of from 100 or more acres each. The total number of separate farms of bullock ploughs admissible would be between 36 and 72. This would ensure the work being done properly and bring in a substantial return per plough.

19. The following represents approximate costs for a single tractor with implements. The prices are those which obtained a year ago. It is impossible to forecast what they may be later :

Capital outlay—	Rs.
Tractor	20,000
Implements—	
Disc plough	4,000
Disc harrow	4 000
Miscellaneous	2,000
Total	30,000

Depreciation taking life at 7,200 working hours $= \frac{30,000}{7,200} = 4\cdot1/6$ per hour

Depreciation per year for 1200 hours = 4·1/6 × 1,200	5,000
Working expenses—	
Staff—	
1 driver at Rs. 50 per mensem	=50
1 assistant and cleaner at Rs.30 per mensem	=30
2 coolies at Rs.15 per mensem	=30
Total, per month	110
Total, per year = 12 × 110	=1,320
Fuel oil 3 gallons per hour for 1,200 hours = 3,600 gallons at 8 annas per gallon	=1,800
Lubricating oil 1/50th gallon per hour for 1,200 hours =25 gallons at Rs. 4 per gallon	=100
Grease 4 annas per hour for 1,200 hours	=300
Miscellaneous 1 anna per hour for 1,200 hours	=75
Spare parts 1/3rd of depreciation charges	=1,667
Annual overhaul lump sum	=500
Total, annual expenditure including depreciation	=10,762
Say	=10,800
Expenditure per acre = 10,800/900	=12

The rates to be charged for ploughing and harrowing have been worked out as follows. The costs per working hours have first been taken and these have been converted into rate per acre:

	Depreciation	Spares	Labour	Fuel and labour	Annual over-haul	Total hour	Rate per acre
							Rs.
(1) Deep ploughing in acres per hour.	¾ 4.17	1.39	1.1	1.9	0.42	8.98	12
(2) Harrowing 1½ acres per hour.	4.17	1.39	1.1	1.9	0.42	8.98	6

I have been conservative in my estimate of working capacity. Makers claim as much as 1 acre per hour ploughing and 1¾ per hour harrowing and even more.

20. The expenditure incurred on tractor ploughing would be recovered from the farms at the above rates.

These recoveries would be as follows :

	Rs.
180 acres deep ploughing at Rs.12	2,160
1,440 acres harrowing at Rs.6	8,640
Total ..	10,800

21. It will be noticed that the rates chargeable include depreciation, so that the whole capital outlay would be recovered in six years, if the tractor works to full capacity from the start. Interest on the initial expenditure has not been taken into account, as the tenants may be given the benefit of this concession. As I have taken the life of equipment as only as 7,200 working hours against a minimum of 8,000 and often much more taken by manufacturers, it is likely, however, that the Estates would recover more than its interest charges in the seventh and subsequent years of working.

The number of working days per year may in time exceed 150. This will result in a greater acreage being worked. In that case, both the annual expenditure and recoveries would exceed the figures worked out above ; but they would still balance one another while the initial cost of the plant would be recovered in a shorter time.

22. To start the scheme the Estates should possess a suitable tractor and implements. As the scheme became popular and expanded more tractors would have to be introduced. This could be done either by the Estates or under some co-operative scheme. There will probably be scope for 10 or more tractors in the Tarai area alone.

23. It is impossible to purchase tractors now, so the scheme could not be started till after the war. I recommend however that the scheme be sanctioned and provision made in the schedule of new demands for the purchase of one tractor and implements as soon as they are again available.

24. After a period of trial, I propose that the scheme be expanded by the purchase of an additional tractor every year till the necessary limit has been reached i.e. when all the available area suitable for the purpose has been developed. As the scheme is fully self-liquidating, there should no objection to the Estates providing all the tractors. But I would limit the number to six in the first stage.

25. Each tractor unit would entail an initial outlay of Rs.30,000 As the life of the plant has been taken as six years replacement of complete units would commence from the 7th year. So there would be a recurring expenditure of Rs.30,000 on each tractor every six years. But recoveries for depreciation would taking place at the rate of Rs. 5,000 per tractor every year. If we had six tractors and one were replaced every year the annual expenditure on replacement would be Rs.30,000 but the annual recoveries would be 6×5,000 which is Rs.30,000 also. The account of expenditure and recoveries for six tractors from the first year onwards is shown in the attached statement. This shows clearly how the expenditure is completely liquidated. The cost of every tractor is recovered in full in six years, and from the sixth year onwards even the annual outlay and recoveries balance.

26. The benefits to the tenant have been fully dealt with. The Estates stand to gain from the rent payable on the increased areas brought under cultivation. Taking the average increase in area as 600 acres for each tractor, and the average rent as Rs.3 per acre, the additional revenue would be Rs.1,800 per tractor, and Rs.10,800 on six tractors per year.

J. W. RUSSELL, I.S.E.,
Superintendent,
Tarai and Bhabar Government Estates,
Naini Tal.

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Account of expenditure and recoveries from tractors expenditure.

Year	1st tractor		2nd tractor		3rd tractor		4th tractor		5th tractor		6th tractor		Total	
	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual	Initial	Annual
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	30,000	5,800	..	..	..	..	..	..	..	..	..	..	30,000	5,800
2nd	..	5,800	30,000	5,800	..	..	..	..	..	..	..	..	30,000	11,600
3rd	..	5,800	..	5,800	30,000	5,800	..	..	..	..	..	..	30,000	17,400
4th	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	..	..	30,000	23,200
5th	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	..	..	30,000	29,000
6th	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	5,800	30,000	34,800
7th	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	34.800
8th	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
9th	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	..	5,800	30,000	34,800
10th	..	5,800	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	..	5,800	30,000	34,800
11th	..	5,800	..	5,800	..	5,800	..	5,800	30,000 Replacement.	5,800	..	5,800	30,000	34,800

Year	Recoveries													
	1st tractor		2nd tractor		3rd tractor		4th trctor		5th tractor		6th tractor		Total	
	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working	Depreciation	Working
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1st	5,000	5,800	..	..	..	..	..	..	..	..	..	..	5,000	5,800
2nd	5,000	5,800	5,000	5,800	..	..	..	..	..	..	..	..	10,000	11,600
3rd	5 000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	..	..	15,000	17,400
4th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	..	..	..	..	20,000	23,200
5th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	..	..	25,000	29,000
6th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
	30,000													
7th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
			30,000											
8th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
					30,000									
9th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
							30,000							
10th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
									30,000					
11th	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	5,000	5,800	30,000	34,800
											30,000			

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KASHIPUR SUB-DIVISION (NAINI TAL DISTRICT) COLONIZATION SCHEMES

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Kashipur Sub-Divison (Naini Tal District) Colonization Scheme

Introductory

THE hill districts of this province contribute a special problem for the rehabilitation of ex-sevicemen because (*a*) of the relatively small culturable area and (*b*) of the heavy recruitment. Available spaces in the Garhwal and Almora districts have already been investigated and scheme for soldiers' settlements there have been examined and submitted for the consideration of Government. In Naini Tal, there is virtually no hope of finding new land in the hill area (except perhaps for two small areas in Jomira Debidhura Patti Malla Pahar Kotah and between Khairna and Ranibagh), and, therefore, attention has to be focussed on the comparatively extensive Bhabar area immediately at the foot of the hills in the south-west part of the district and the Tarai are below it, which constitute the sub-division of Kashipur. There are three distinct blocks of land which afford possibilities of settlement: (1) Sanwaldeh and Dhella villages to, 7:11 miles west to Ramnagar, (2) Garhi Inderjit and a number of villages to the north and east of Kashipur and (3) Garhi Negi and villages to the north- west of Kashipur. The latter two blocks are situated on either side of the Dhela and converge on Kashipur from the north and the north-west respectively so as to make a compact whole from the western border of the Ampokhra Reserved Forest and the Kosi to the eastern border of the Jaspur reserved forest. It is convenient to examine these blocks as one compact area which for the sake of this report may be called the North Kashipur Block. These blocks are examined in the report in two separate parts.

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PART I—SANWALDEH AND DHELA VILLAGES

Situation of the area selected

Sanwaldh is 7 and Delha 11 miles from Ramnagar, abutting the section of Kandi Sarak that leads from Ramnagar to Kalagarh and the Forest Motor Road. These two villages are about five miles apart near the banks of two hill streams after which they are named. The area is actually in Naini Tal district but is adjacent to the Garhwal boundary at Koti Rao. Apendices A and B are the blue print maps of Sandwaldeh and Dhela respectively.

Brief description of the villages

3. These villages lie at the foot of the hills whence the Bhabar area starts, both owned by Rai Bahadur Prem Ballabh Bilawal. The forest area extends up to the road which almost marches with the northern boundary of the villages. Inside the boundary of the villages one comes across patches of tangled undergrowth of creepers and thorns and clumps of scrub trees but, in the main, the country is open and level, with extensive plots of culturable waste. The land in

Dhela is slightly slopy and uneven at places and practically all uncultivated, but in Sanwaldeh there are large tracts of level cultivation. The appearance of the viliages is more of the plain type than in other parts of the Bhabar, the houses being close together and not scattered over the fields as elsewhere. Both the villages lie on the banks of streams which are utilized for irrigation purposes by water being taken out to feed canals and water channels.

Sanwaldeh is divided into two parts : Sanwaldeh east and Sanwaldeh West. The area of the former is 376 acres and of the latter 392 acres. Out of 376 acres, 41 acres are under cultivation, 19 acres barren and 201 acres culturable. It is only the northern portion of the village that is under cultivation, being within the command of the canal taken out of the Sanwaldeh river. If the water supply can be imploved, all the area to the south can be brought under the plough. A reference to map (Appendix A) will show that the whole viliage was once cultivated and divided into fields with water channels laid out and a wire-fencing put up by the proprietor in the north and up to a certain distance in the south. It was due to the non-accessibility of the water that all the land within the fenced area could not be brought under cultivation. In Dhela (total area 455 acres) 11 acres are barren, 425 acres culturable waste and only 19 acres are under cultivation and that too of a precarious nature. Men from the east come and do a little cultivation, generally growing tobacco around the site of khattas, and go back before the rains. Out of 425 acres available for colonization, the proprietor wants to keep 58 acres for himself or his tenants and to allot 367 acres to ex-servicemen. The village is provided with water channels and is divided into fields having been, once upon a time, under cultivation which came to grief as a result of the depopulation of the tract after the great influenza epidemic of 1918 and the deterioration of water-supply owing to the retrogression in the bed of the Dhela river. Restoration of the water supply will bring the whole area under cultivation once more.

Both the villages have good culturable soil and the existing cultivation therein bears testimony to the fertility of the soil. Manure is obtained from large herds, which are kept on the village lands as long as possible, generally for three years at one place. The Bhabar soil requires a moderate amount of manuring in order to maintain its productivity. All the three villages (Sanwaldeheast and West and Dhela) give promise of yielding 884 acres of culturable land and even more if Mr.Bilawal is agreeable to giving up all the culturable land lying waste. A suggestion was made to take up some area in Laldhan also but very little culturable area is available there and means of irrigation are meagre. I have, therefore, discarded it.

Rainfall

4. The rainfall in the hills is characterized by its concentration generally at places where elevation takes places, namely, the foot of the hills and the foot of the snows on the summit of hills. In the Bhabar the rainfall is heavy, the average in the tract under examination being 65 inches a year.

Irrigation

5. While the agricultural potential is bright, irrigation operates as a limiting factor. Sanwaldeh East and West are served by a canal with a permanent headworks which takes off from the Sanwaldeh river. At present water is barely sufficient for the existing area under crops. The canal belongs to Rai Bahadur Prem Ballabh Bilawal. It will be necessary to take over the canal under direct control and improve the headworks to augment the supplies in the canal. This is essential in the interest of the development of the area. If the project is not found practical, I wonder if it will be possible to extend the Kosi Canal by about half a mile across the Sanwaldeh by means of an acqueduct. I understand there is surplus water available in the Kosi Canal, and its extension will lead to the irrigation of the whole of the area that does not get water at present. Either of the two works should not cost more than Rs.20,000.

Irrigation in Dhela is done by placing a temporary bound across the Dehla river. Owing to the retrogression in the bed of the river, it is becoming increasingly difficult to make the *bund* with the result that a marked decline in cultivation and irrigation has set in. The annual cultivated area has gone down from 110 acres in 1349 *Fasli* to 96 acres in 1350 *Fasli*, 75 acres in 1351 *Fasli* and 19 acres in 1352 *Fasli*. Mr. C. M. Bowder, I.S.E., Superintendent, Tarai and Bhabar Estates, is of the opinion that a permanent canal headworks can be constructed at a cost of Rs.20,000. This project must be taken in hand at once as it gives promise of making 425 acres available for raising food crops or at least in a major part of it, in an area where people always suffer from scarcity of food-grains. This will also help to re-populate the village which is now lying deserted.

Wild animals and fencing

6. The menace from wild animals comes both from the north and the south, probably the former is more serious. In the north lie the forest-clad hills and in the south the Tarai and Bhabar forests. As the villages lie in isolated blocks, the protections will have to be offered from all the sides. The wild animals are tigers, *chitals*, pigs and *nilgais*. Their number is bound to reduce with the advancing cultivation and the arrival of settlers who are bound to be marksmen Even so, it will be necessary to have an appropriate fencing to keep off the depredation of wid animals. Rai Bahadur Prem Ballabh Bilawal amaintains in good repairs an extensive wire fencing in Sanwaldeh and it will only be necessary to extend the same. I consulted the Divisional Forest Officer (Mr. M. J. Mc-Donald) and Mr. Bowder regarding the most effective form of fencing. The best type offence would be a high wall 4½′ high surmounted by three strands of barbed wire making a fence 6″ 6′ hig in all, with another strand of wire below the foundation to keep away the burrowing animals. I have marked the proposed fencing in maps, Appendices A and B. Their total length is estimated to be 6-7 miles and is estimted to cost about Rs.30,000. Such a fence would be quite effective against the wild animals.

Health conditions

7. The villages lying along the upper border of the Bhabar are not unhealthy. People suffer from malaria in the post-monsoon period but the disease does not assume the chronic form which manifests itself in large spleens and anaemic faces. Sanwaldeh is well populated and people look healthy. I do not think malaria is to be feared. It can easily be controlled by the adoption of the usual anti -malaria measures. In the winter the climate is quite bracing and healthy.

Means of communications

8. The proximity of the area to Ramnagar—the railhead—with which it is linked by a good forest motor road makes it easily accessible. Motor service has recently started between Haldwani and Ranmagar, and so the place is well connected.

Agricultural prospects

9. The soil is capable of raising all crops, if irrigated, and is well drained to be able to grow tobacco. A note on the rotation of crops prepared by Mr. M. C. Corbett together with an estimated annual income to settlers is reproduced below :

> "From the crops which were on the land it could be seen that the soil was in good heart. The wheat crop (in the month of March) was standing well and in places where there was tobacco, the crop looked good. Tobacco is grown in these parts as a cash crop but the system adopted is peculiar to the tract. Generally speaking the tenants here keep large herds of buffaloes and milking cows in what are termed *khattas*. These animals produce a considerable quantity of manure in the form of cow-dung and urine-earth. This cow-dung is preserved and put into the fields where tobacco is to be grown. (Cow-dung is rarely used as a fuel in these parts as fuel-wood is plentiful). The result of this is that the fields for tobacco are very highly manured and the tobacco crop is taken for a period of two or three years. In this space of time, the soil becomes depleted of is fertility and it is allowed to lie fallow for a short period, is again very heavily manured and tobacco taken again. The tenants who adopt this form of cultivation are not permanent residents of the area. They move in the forest area along with their cattle, spending the winter months in the forests lower down and the warmer summer months in the higher areas. From the above it can be gathered that the soils are fertile but their fertility is easily exhausted and the land needs rest more frequently than other soils or, in the alternative, heavier and more frequent dressings of manure."

Bearing the above points in mind, it is obvious that any rotation which is proposed will be one where in cattle occupy a very prominent position and tobacco is grown in the general rotation. The following two rotations propose themselves :

	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
I.	Fallow	Tobacco	*Sanai* or maize.	Wheat	Paddy	*Lahi*
II.	Maize	Bersem or oats.	Paddy	Gram	Fallow	Tobacco

In an 8-acre holding, Rotation I would occupy 5 acres and Rotation II 3 acres.

Area	Field no.	Year I		Year II		Year III	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1⅔ ..	Ac. 1	Fallow	Tobacco	*Sanai* or maize.	Wheat	Paddy	*Lahi*
1⅔ ..	Ac. 2	*Sanai* or maize.	Wheat	Paddy	*Lahi*	Fallow	Tobacco
1⅔ ..	Ac. 3	Paddy	*Lahi*	Fallow	Tobacco	*Sanai* or maize.	Wheat

So that in any one year the grower will have the following distribution of crops on his 5-acre holding :

	Acres.
Fallow	1⅔
Tobacco	1⅔
Sanai or maize	1⅔
Wheat	1⅔
Paddy	1⅔
Lahis	1⅔

It will be noticed that I have mentioned '*sanai* or maize'. In case the settler has more heads of cattle it may be necessary for him to grow maize and compensate for the *sanai* as green manure by giving heavier doses of cow-dung manure. If, on the other hand, he has not enough cattle then he should take the *sanai* as green manure as the tobacco crop will exhaust his soil and the following wheat crop will naturally be a very poor one:

Rotation II

Area	Field no.	Year I		Year II		Year III	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1·0	1	Maize	Bersem	Paddy	Gram	Fallow	Tobacco
1·0	2	Paddy	Gram	Fallow	Tobacco	Maize	Oats
1·0	3	Fallow	Tobacco	Maize	Oats	Paddy	Gram

So that in any one year the grower will have the following distribution of crops on the rest of his holding :

	Acres
Maize	1·0
Bersem or oats	1·0
Paddy	1·0
Gram	1·0
Fallow	1·0
Tobacco	1·0

Here again it will be noticed that an alternative has been suggested in the form of *bersem* or oats. This has been done so that the settler may be in a position to grow either *bersem* for a fodder for his animals or oats as a concentrate.

Thus combining the two rotations the grower will have the following distribution of cropped areas :

	Rotation I	Rotation II	Total
	Acres	Acres	Acres
Fallow	1¾	1·0	2¾
Tobacco	1¾	1·0	2¾
Maize	1¾	1·0	2¾
Sanai	1¾	..	1¾
Wheat	1¾	..	1¾
Paddy	1¾	1·0	2¾
Bersem	..	1·0*	1·0
Oats	..	1·0*	1·0
Gram	..	1·0	1·0
Lahi	1¾	..	1¾

In the case of crops marked with an asterisk it depends on what crop or crops the settler actually takes. In any case, both the crops suggested will not have any immediate value. They will either go to feed the cattle or enrich the soil and for purposes of estimation the following crops will be taken into account :

	Acres
Tobacco	2¾
Maize	1·0
Wheat	1¾
Paddy	2¾
Gram	1·0
Lahi	1¾

Estimates of Returns

Crop	Area Acres	Cost of cultivation Per acre	Total	Returns Per acre	Total	Profit
		Rs.	Rs. a.	Rs.	Rs. a.	Rs.
Tobacco ..	2¾	100	275 0	175	481 0	206
Maize ..	1·0	30	30 0	50	50 0	20
Wheat ..	1¾	70	120 0	120	210 0	100
Paddy ..	2¾	60	165 0	100	275 0	110
Gram ..	1·0	30	30 0	42	42 0	12
Lahi	1¾	30	52 8	70	102 8	50
Total ..	..	..	..	..	..	498

or roughly Rs.500

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Thus from the arable land the cultivator can expect a return of approximately Rs.500 per year which represents an income of about Rs.42 per month. However, we have not taken into account the cost of cultivation of the fodder crops and the returns the settler will get from his milch animals in the form of milk, butter or *ghee.* The cost of cultivation of the fodder crops will be a small and negligible sum but the returns from the milch animals will be considerable. We must take into account the fact that besides the fodder and other crops for the cattle which the cultivator will grow, here are also very good facilities for the growing of the fruits in the nearby forest lands. Each settler could maintain about six heads of milch cattle for which he could expect a return of about Rs.50—60 per animal which would increase his income by another Rs.300 to Rs.360 per annum. Thus in all the income of the settler would be in the region of Rs.70 per month.

We must take into account the fact that since the villages are situated near the Government Forest areas, there are good opportunities for the settlers to obtain work in the forests either as contractors or as labourers and also the fact that the settlers will have several advantages such as free fuel and cheap building and house repairing materials.

Subsidiary occupations.—Poultry keeping and fruit gardening especially the growing of bananas could be taken up with profit and these would also yield a satisfactory income if the growers could combine in the marketing of their products jointly.

Acquisition by State and cost involved

10. Rai Bahadur Prem Ballabh Bilawal is the proprietor of the villages under report. He is agreeable to granting loans on security to the extent of Rs.200 per plough and other facilities to ex-service men to settle on his land but is not willing to quit his estate. This may be an argument against acquisition of his zamindari. On the other hand, considerable capital outlay is required to develop the land and make it habitable, and the Rai Bahadur is not in a position to incur any heavy expenditure. This may be an argument in favour of acquisition of the property in the interest of the rehabilitation of the area. This is a matter for Government decision. I do not advocate acquisition on administrative grounds. The villages lie in two isolated blocks and constitute, on the whole, a small area. It will be expensive and inconvenient to Government to administer two small separated estates. I think the Rai Bahadur should be asked to make a lease of proprietary rights in favour of the settlers "Land Settlement Co-operative Union" which should run the colony on the principles enumerated by Sir Malcolm Darling. The capital expenditure on development will be the State's contribution to the resettlement of ex-servicemen. I think the Rai Bahadur will be agreeable to granting a lease to the Union. It does not appear desirable to reduce the settlers to the status of tenants of a private zamindar. If he refuses, acquisition proceedings can be started. The cost of acquisition is estimated by the Tahsil authorities at Rs.8,000.

Status of settlers

11. If the Government acquire the land, the settlers will acquire occupancy status in Crown land else they will be Khaikars (a status

almost equivalent to that of occupancy in the plains) either of the Co-operative Union or of the zamindar, if direct relationship is established with the latter. The Rai Bahadur is willing to grant them Khaikari status. In the small hill estates, I have advocated outright sale of proprietary rights to settlers in view of the strong predilection in favour of Hissedari rights in the hills. Not so is the case in the Bhabar where conditions approximate more to plains. In the Kham Bhabar Scheme relating to Garhwal, I have suggested tenancy rights for settlers and I hold the same view in the case of Naini Tal Bhabar.

Settlement prospects

12. When the suggestion of founding an ex-soldiers' settlement in villages Sanwaldeh and Dhela was first mooted, Lieut.-Colonel H. L. Puxley, Services Resettlement Liaison Officer, made confidential enquiries from the Commandant, 18th Royal Garhwal Rifles and some groups of the Indian Pioneer Corps to sound servicemen's views in regard to settlement in the area. The Units asked the very pertinent question as to what their status was going to be. Will they be Hissedars or tenants ? If tenants, will they be tenants to Government or to zamindar ? The consensus of opinion was that generally the high caste Brahmin or Rajput would not like to live as a tenant of a zamindar, partly because of the suspicion of insecurity of tenancy. But there appears to be a misunderstanding about this in that they seem to think that they will be mere tenants-at-will. The Rai Bahadur is willing to confer Khaikari rights on them, which is a permanent and abiding right. Two groups of the I. P. C. intimated willingness of some 25 men from each group to settle in the area but not merely as tenants of a zamindar. The conferment of Khaikari rights, however, will, as stated by Mr. W. W. Finlay, Deputy Commissioner-in-charge, Kumaun Division, give them sufficient security of tenure. The 'shilpkars' in two units have also expressed their desire to settle down in the area. After all not more than a hundred ex-servicemen can be settled in these three villages and it will not be difficult to find the requisite number of men. I think one can turn the settlement into one exclusively for 'shilpkars' to help them settle down on land. On the whole, the climate of the region is better than most of the other villages in the Tarai and Bhabar, and the general health of the residents is not bad. Fuel, fodder, grass, wood, timber and stones are readily available in the adjoining forests, which are essential requirements of a cultivator. Extensive grazing lands lie in the forests, quite in the vicinity of the villages, for any number of cattle to graze. Moreover, inhabitants of these villages can eke out their modest income from agriculture alone by working in the forests for the greater part of the year. Means of communication are good and the irrigation possibilities promising. Prospects of settlement are definitely favourable.

Plan of development and ultimate colonization

13. As remarked in the concluding sub-paragraph of paragraph 3, at least 884 acres are available for settlement. In view of the ready availability of grazing lands and fuel and timber in the forests, it is not necessary to make a large discount for these purposes and it will be

enough to knock out 84 acres out of 884 (roughly ten per cent.) to make provision for purposes other than agriculture, to wit, fruit gardening (bananas in particular), building sites, grass-lands and fuel and timber reserves to make the colony self-sufficient as far as possible. A certain amount of terracing or levelling may be required at places, but there is not much to be done in the way of reclamation of land. Development in this area involves making provision for irrigation water and the construction of a wall or fence to protect the crops from the depredation of wild animals. Lines along which development should proceed in regard to both these essential matters have already been indicated elsewhere. It is absolutely necessary to improve the head works on the Sanwaldeh or to extend the Kosi Canal for the proper development of Sanwaldeh East and West and to provide a permanent head-work on the Dhela for the improvement of the village of that name. A number of water channels for spreading the water throughout the area, already exist and they will only have to be put in proper order. Equally important is the work of constructing a wall-fence all round the area chosen for settlement. A stone wall 4½′ high, surmounted by 3 strands of barbed wire to raise the height to 6′6″ with a strand of wire below the foundation should be constructed along the entire area as indicated in blue maps, Appendices A and B. Stone is available nearby and barbed wire should now be available from the Army. It should be possible to do the whole work within a year. If these two works are satisfactorily carried out, success of the settlement is assured.

Number of settlers who can be accommodated

14. According to my calculations at least 884 acres of land can be made available for the ex-soldiers' settlement. In the hill pattis, I have advocated 5-acre holdings for each settler and in the plain districts 10-acre holdings,with due regard to the average extent of holdings and the annual return to settlers. In the Garhwal Kham Bhabar, I have suggested an 8-acre unit on the same grounds. In the submontane area, the average size of holding is said to be 4-5 acres, often less. I am in favour of an 8-acre unit for this area also. On the basis of crop rotations suggested in paragraph 9, each holding should assure a settler an annual income of about Rs.500 or Rs.42 a month, or Rs.70 a month along with subsidiary occupations. This is quite enough to enable a settler and his family to maintain a reasonably comfortable standard of living.

Out of 884 acres available for settlement, 800 should be brought under cultivation which means that it is possible to settle 100 ex-servicemen on 8-acre unit basis. Fifty acres should be allotted for fruit-gardening, giving each settler half an acre share in the orchard. The remaining 44 acres will form timber, fuel and fodder reserves for the colony and for building sites, etc. As suggested in other schemes, the orchard should be held in common between the settlers.

System of farming

15. It is now an accepted fact that the system of farming should be co-operative and I have already made this recommendation in other schemes. I need not stress the benefits of co-operative farming and

co-operative marketing which will be done under a land settlement co-operative society of the settlers as advocated by Sir Malcolm Darling

Management

16. Is a separate staff for management of the colony in the initial stages of development necessary ? The answer can be provided by having a reference to the plan of development which contemplates only two things (1) Irrigation Works and (2) fencing. The former will be executed by irrigation experts, and the latter, perhaps, by the Public Works Department. I, therefore, do not consider a separate officer or staff necessary for this colony during its development stage. Fencing can be done under the supervision of the Superintendent, Tarai and Bhabar Estates. As soon as both the works are completed, the Land Settlement Co-operative Society of the Settlers can be formed to conduct its own affairs. To begin with, the Assistant Registrar of Co-operative Societies of the Circle may be the President of the Board of Directors and an Inspector of the Agriculture Department may be detailed to work as Secretary.

Initial measures necessary for colonization

17. (i) *Public Health*—For obvious reasons I cannot recommend a separate anti-malaria organization for these two tiny blocks of colonization. In my Kheri report I have made a suggestion for reducing the charge of a Medical Officer of Health in malarious districts in order to facilitate more intensive efforts and better superintendence of anti-malarial and other health measures. There is a chief medical officer of health in the Tarai and Bhabar Estates but I consider it essential in the interest of the general health of the people that there should be a separate malaria trained medical officer of health for Ramnagar and Kashipur area where the malaria is the chief scourge. This additional staff can look after the health of the new settlers also. As this should be a part of a wider scheme, no expenses need be apportioned to this colony on this account.

(ii) *Development of land*—Not much efforts are required for the development of the land itself in order to bring it under the plough. Whatever little is required in the form of clearance, levelling and terracing can be left to the settlers. Wall-*cum*-barbed wire fencing is essential and is likely to cost Rs.30,000.

(iii) *Irrigation facilities*—Improvement and construction of head-works over the Sanwaldeh and the Dhela is estimated to cost Rs.40,000 and an additional Rs.5,000 may be found for putting the existing water channels in order and for such extensions as may be necessary.

(iv) *Means of communication*—Nothing in particular required.

(v) *Housing*—A recoverable grant of Rs.500 per settler may be made at an interest of 3 per cent. per annum, to enable him to construct mosquito-proof houses of approved design. This suggestion has already been adopted by Government in connexion with other schemes. The investment will amount to 100 × 500=Rs.50,000.

(vi) *Bullocks and implements*—These will cost about Rs.1,000 and should be acquired by ex-servicemen out of deferred pay and gratuity paid to them on their discharge.

Initial capital outlay

Non-repayable—

	Rs.
(i) Cost of acquisition (if a lease of proprietary rights in favour of the Land Settlement Co-operative Union is not approved).	8,000
(ii) Public Health	Nil. Being part of a general scheme.
(iii) Development of land	30,000
(iv) Irrigation facilities	45,000
(v) Means of communications	Nil
Total ..	83,000

Repayable—

Construction of houses	50,000
Total ..	1,33,000

Estimates of returns and how far costs recoverable

19. Estimated non-repayable cost amounts to Rs.83,000, and repayable cost to Rs.50,000, in the shape of house-building grant. The latter should be recovered at an interest of 3 per cent. per annum, in 40 half-yearly equated instalments, i.e. in a period of 20 years. At this rate, each settler will pay Rs.33-8 a year, which is fair and reasonable.

Additional 884 acres of land will be brought under cultivation. The rental value may be assessed at Rs.4-8 per acre and should give to Government an annual return of Rs.3,978. In addition to this, the house instalments will bring in Rs.3,550 a year.

Cottage industries

20. Manufacture of woollen articles, poultry-keeping and wood and timber work hold out possibilities. The dairy-farming is possible, but there is no good market at hand for dairy products.

Summary

21. (1) Possibilities of land settlement in (i) Sanwaldeh and Dhela, (ii) Garhi Inderjit, and a group of villages north and east of Kashipur and (iii) Garhi Negi and villages to the north-west of Kashipur, examined.

(2) Sanwaldeh is 7 and Dhela 11 miles west of Ramnagar on the Forest Motor Road to Kalagarh.

(3) In Sanwaldeh East 316 acres, Sanwaldeh West 201 acres and Dhela 367 acres (or 425 acres if the proprietor does not reserve a part for himself), totalling 884 acres, available for colonization.

(4) Rainfall 65″ a year, more than enough.

(5) Irrigation facilities in the area available for colonization, non-existent. Improvement of head works on the Sanwaldeh or extension of the Kosi minor and construction of a new headworks on the Dhela absolutely necessary.

(6) Wild animals, particularly tigers, *chitals*, pigs and *nilgai*, will cause considerable damage to crops. A 7-mile stone wall fence

4′ 6″ high, surmounted by 3 strands of barbed wire to make the whole 6′ 6″ high, with a strand of wire below the foundation, essential.

(7) The area is malarious but comparatively much better than other places in the Tarai and Bhabar.

(8) Means of communication fairly good.

(9) Agricultural prospects, favourable.

(10) A lease of proprietary rights by the proprietor in favour of a land settlement co-operative society of settlers recommended, or, in the alternative, acquisition by State. Cost of acquisition estimated at Rs.8,000.

(11) Settlers to enjoy occupancy status in Crown land and Khaikari status otherwise.

(12) Settlement prospects good.

(13) Plan of development; (i) improvement and construction of head-works on the Sanwaldeh and the Dhela or extension of the Kosi minor and repairs to existing water channels, (ii) construction of stone-wall-*cum*-barbed wire fencing around the colony, (iii) 800 acres for agriculture farming, 50 acres for fruit gardening and the remainder for forming grass, fuel and timber reserves suggested.

(14) Some 100 ex-servicemen can be settled on an 8-acre unit basis.

(15) Co-operative farming and collective fruit gardening recommended.

(16) Separate staff of management not necessary for the initial stages of development in view of the smallness of the colony and lack of adequate development work, beyond execution of irrigation projects by experts and construction of a fence by the Public Works Department.

(17) Initial measures necessary for colonization. (i) Public Health —No specific work for the colony. A general health scheme for the malarious area (Ramnagar-Kashipur) suggested. (ii) Development of land—making of wall fence. (iii) Irrigation facilities—Improvement of head-works on the Dhela and repairs to existing water channels. (iv) Means of communications—No particular work necessary. (v) Housing—A recoverable grant of Rs.500 per settler at an interest of 3 per cent. per annum. (vi) Bullocks and implements provision to be made from settlers' own funds.

(18) Initial capital outlay.

Non-Repayable.

	Rs.	
(1) Of acquisition (failing a lease in favour of co-operative society)	8,000	
(2) Public Health	Nil	Being part of general scheme.
(3) Development of land	30,000	
(4) Irrigation facilities	45,000	
(5) Means of communications	Nil	
Total ..	83,000	

Repayable.

Construction of houses	50,000	
GRAND TOTAL ..	1,33,000	

(19) Estimates of returns and how far costs recoverable. Cost as above.

Returns

(1) From land rents Rs.3,878 a year.

(2) House instalments Rs.3,550 a year.

(20) Cottage industries—

(i) manufacture of woollen articles,

(ii) poultry, and

(iii) wood and timber work indicated.

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PART II—North Kashipur Block

Situation of the area selected

The area selected for agricultural development and colonization occupies the north centre of the Kashipur sub-division in Naini Tal district, covering the bulk of the area on both sides of the Dhela. It is bounded on the north by Chilkia Bhabar, on the east by the Kosi River, on the south by the main Tarai road except for villages Daduwala, Gora and Haldua Shahu which just out further south, and on the west by the Jaspur reserved forest and the villages of Tanda Prabhapur, Garhi Husain and Bhawanipur. The above area is demarcated on blue print map (Appendix C) attached to this report.

Brief description of the tract

2. The tract is about 7 miles long in the north broadening to about 13 miles in the south with an average breadth of 6 miles making roughly an area of about 60 square miles. In this area lie 49 villages with a total area of 36,724 acres. Of the above, 29 villages covering an area of 23,673 acres lie to the east of the Dhela between the Dhela and the Kosi rivers and 20 villages comprising 13,051 acres to the west of the Dhela between the Dhela and the western boundary of the area. The whole of this area falls in the Tarai region between the Chilkia Bhabar and the main Tarai road, presenting typical topographical conditions and characteristics of the Naini Tal Tarai, which I have described at length in my Naini Tal Tarai colonization report. I need not recapitulate the conditions mentioned therein but restate some of the salient features. It is one vast stretch of flatcountry with a very gradual slope of about 10—12 feet to a mile in consequence of which there are no rushing torrents overflooding their banks, except the Kosi on the extreme western limit. The few small streams that flow through the area remain generally contained within their banks and cause no damage. The only two rivers of any importance are the Kosi which washes the western boundary of the colony and will need a buffer state along its bank to save the colony from its fury, and the Dhela which is generally a well-behaved river.

The area has the Jaspur reserved forest on its north-western boundary and the Ampokhra reserved forest on its north-eastern corner, and it is from these sides that the bulk of the wild animals make their inroads. Some protective measures will have to be adopted in that direction. There is no 'belt of springs', as in the Lalkuan-Tanda zone, with the result that the dampness and unhealthiness is not so severe as in the Lalkuan region. The country is largely characterized by its large savannahs of tall grasses and patches of civil forests generally of an inferior nature. In its general appearance, it presents a succession of gentle dips and rises so widely spread as not to be perceptible to the eye. In the area west of the Dhela, drainage is fair, but in the north-eastern corner the surface drainage has been interfered with by artificial water courses. Here the evil effects of the old system of irrigation are still evident, and it is in this part that there is an extensive network of canals largely in a dilapidated condition increasing sickness around.

The soil is naturally fertile, and owing to its inherent capabilities the outturn is so satisfactory that manure is seldom required. The soil is generally heavy loam, clayish in the depressions and lighter on the higher ground between the lines of drainage. The soil is capable of bearing all the usual crops. The climate is notoriously bad, comparatively better than he eastern Tarai, but on the whole intensively malarious.

Magnitude of the problem

3. Malaria—hyperendemic malaria is the bane of the tract which otherwise gives promise of becoming an important granary of the province. Due to recent developments in the science of malariology, it should not be difficult to control the malady to a large extent. What is required is sustained effort and a permanent anti-malarial organization as well as a persistent long-term policy for attacking malaria from all sides until it is brought under control. I have dwelt at length on the magnitude of the problem involved in the development of the Naini Tal Tarai and I need not repeat those arguments as almost the same considerations apply to the case in point. Suffice it to say that the real problem of the tract is the making of an effort in a big way and a determination that the tract will be improved.

Drainage and river system

4. My remarks on the drainage and river system of the Naini Tal Tarai also apply to this area except that there is no belt of springs here. The principal rivers of the region are the Kosi on the east and the Dhela which flows through the centre. They are perennial streams, but most of the minor streams dry up or shrink to minute dimensions in the hot weather. Of the minor streams, the chief are the Bahilla between the Kosi and the Dhela, the Tumaria, Pathariya, Dandi and Lapkana intersecting the country between the Dhela and Jaspur. The latter two streams as also the Peli and Phika on the extreme west are outside the boundaries of the proposed area. Almost all of these smaller streams are utilized for irrigation purposes and their water is drawn out to feed a large number of minors and water channels. In the area east of the Dhela, drainage has been partly spoilt by the numerous canals that over-run the country, some of which will have to be dismantled even as anti-malaria measure. I do not consider any major drainage work necessary in the area west of the Dhela but in the area to the east, some of the canals will have to be closed and some converted into drainage channels while a few more will have to be built to drain the area properly and effectively. Though requiring earnest attention and amelioration of the existing conditions, the drainage will not present a serious problem to development and settlement of the tract.

Markets and means of communications

5. The principal market for the area is Kashipur, the headquarters of the sub-division. The other important markets are Jaspur, 9 miles from Kashipur, on the western border. Thakurdwara in Moradabad, 6 miles off, Bazpur 12 miles to the east, and Ramnagar 16 miles to the north. The area is thus surrounded on all sides by locally important towns and markets.

According to the post-war emergency road construction programme, the Kashipur-Ramnagar and the Kashipur-Takurdwara roads are going to be metalled very soon. This will make an important contribution to the development of the tract, though the latter road does not pass through the proposed colony at all. Many of the villages east of the Dhela fall on the main Kashipur-Ramnagar road and only a few branch roads will be required to connect the remoter villages to this important artery of communication. But the western part of the colony, which is bothphys ically and climatically better than its eastern counterpart, is not so well connected and is cut off and isolated by the Dhela which divides the two areas and does not allow easy access to the important Kashipur-Ramnagar road and the railway line between Moradabad and Ramnagar. For the development of the area west of the Dhela, it is necessary to metal the Kahipur-Jaspur road, a length of nine miles, not so much to provide communications within the area as to connect it from without. There is a sugar factory at Kashipur and this road provides an important line of transport for the western wing of the colony. Then again, a road must lead off from some convenient point on this road (say from near Lalpur), passing through the centre of the western colony *via* Garhi Negi to Gaushala Railway Station and finally to meet the main Kashipur-Ramnagar road somewhere near Pipalsana. In the ultimate stages of its destination, the Dhela will have to be crossed, and a cause way or ferry bridge will serve the purpose. The area has long been neglected and it is now time that the means of communication should be improved to connect it with important markets, and thus assure its full development. The central road, above delineated, will help to connect the southern half of the western colony with Kashipur and its northern half with Ramnagar. The projected railway line from Kashipur to Thakurdwara and then to Jaspur will help to open up the area on that side though it does not touch any part of the colony itself. In short, the road programme for the area contemplates (i) metalling of the Kashipur-Jaspur road (9 miles), (ii) Lalpur-Garhi Negi-Gaushala-Pipalsana road (10 miles), and (iii) branch roads connecting the more distant villages with important lines of communication (12 miles). On the Kashipur-Jaspur road, cement tracks to the length of 2 miles from the Dhela were laid out by the Military and the whole length was proposed for being metalled but the urgency ceased with the termination of War. Much as I would like to have the above 19 miles metalled up in the interest of this long-neglected part of the country, I do not wish the development scheme to founder on rock-bottom of financial stringency. If it is absolutely necessary to carry out the above much needed road construction programme in instalments, I shall recommend the construction of the Kashipur-Jaspur road up to about 5 miles only and then to be diverted north up to Garhi Negi, another stretch of 5 miles. This will at least connect up the area with Kashipur.

Rainfall

6. The mean annual rainfall of the area is about 50″ in the year, which is more than adequate for a moist country like this.

Irrigation

7. The area to the west of the Dhela is better drained than the area to the east where there is a jumble of canals, big and small. I have already examined the question of canal irrigation in Tarai in my Naini Tal Tarai report at some length and have expressed my preference for tube-well irrigation. The canals in the eastern zone are in a large measure responsible for interfering with natural drainage. Many of the canals are in a dilapidated condition due to their long disuse extending to about 20 years while not a few are no better than *kuchchha* drains, overflowing their breached banks and thus causing boggy conditions facilitating breeding of mosquitoes. In my opinion, several of these cuts and minors should be closed and irrigation should be supplemented by tube-wells even as anti-malaria measure. The possibility of tube-well irrigation should be investigated. Artesian wells, of which there are a couple do not yield a sufficient discharge for irrigation purposes.

In the area west of the Dhela which is drier and better drained, canal irrigation may continue. Most of the villages can be served by the Kilawali canal, taken off the Dhela, which used to flow through the area in the past. This canal can be resurrected. It fell into disuse when the country was depopulated after the influenza epidemic of 1918 and the plundering operations of the gang of Sultana. This canal can be reinforced by tube-wells, if possible.

Drinking water

8. Drinking water obtained from the top levels of the sub-soil water in the Tarai is definitely considered as injurious to health by the Public Health Officers. It must be drawn from sources some 150 to 200 feet below the surface. Fortunately the area lies within the artesian belt and an Artesian well is working quite successfully in the Government Cattle Farm and another at Kashipur. I think it is possible to strike at such a resource at a number of places near the inhabited site to supply water for human consumption. In order to prevent formation of pools, stop-corks should be provided to the strainers to stop wastage and unhealthy conditions created by the unceasing flow of water in this moist country.

Wild animals and fencing

9. I have dwelt at length on the subject in my Naini Tal report. Wild beasts including tigers, panthers, bears, blue bulls and several species of the deer abound in the neighbouring forests. The greatest amount of damage is caused by the wild pigs which can burrow even underneath stone-walls and which by their wasteful habits of eating reduce the crops to a very poor state. The dear, grazing in herds, do not permit the crops to grow at all in the patch of land invaded. Mention must also be made of the common monkey which abounds in the tract and causes damage to the crops in all its stages.

I will advocate the same plan of action to meet the menance from wild animals, which I did in the case of Naini Tal Tarai. The tract under examination is surrounded by reserved or protracted forests in the west, north and the east, (Jaspur R. F. in the west, Sheonathpur and Ampokhra P. F. in the north and the north-east and Ampani P. F. in the east). The depredation of wild animals can be greatly minimized if a belt, half a mile deep, is kept clear of forests and tall grasses between the colony and the forest so as not to allow cover to wild animals from that direction. Along the outer edge of this belt should be construct ed a stone-wall about 4½ feet high with two or three strands of wire on top and a couple of them underneath the foundation to keep off the burrowing animals. This should be reinforced by the plantation of a cactus fence behind the wall. The wall should commence from south of Sheorajpur in the west, along the eastern boundary of the Jaspur reserved forest up to the limits of the Government Cattle Farm opposite Dingarpur (a length of about 7 miles), then along the boundary of the villages constituting the cattle farm to a distance of 7 miles and thence forward up to the Kosi River in the east, a final stretch of 7 miles. The wall length will thus be 18 miles, of which 4 miles should be constructed by the Government Cattle Farm and the remaining 14 miles from out of the funds allotted for the development of the colony. The weakness of the walling system lies in its vulnerability particularly at the site of the streams where the wall will have to bend along the bank of the stream for a furlong or two, with pill-boxes or sentinel posts built at the site of the streams, fortified by ex-servicemen, chaukidar to shoot at approaching animals that will find no cover for about half a mile and will soon be killed or discouraged.

Malaria and health conditions

10. The tract is obviously malarious, but comparatively speaking less malarious than the other parts of the Tarai. A malarial survey was carried out in the tehsil of Kashipur in 1927 by Captain Clyde, I.M.S., Assistant Director of Public Health (Malariology). According to his investigations, the splenic rate for the tract, east of the Dhela (between the Dhela and the Kosi), was 83 per cent. and the parasite index 36 per cent., very high percentage indeed. Captain Clyde had the following observations to make in respect of this area :

> " That the canal *guls* themselves are the chief larvae-breeding places has been noticed throughout the tract. By raising the subsoil water level and also impeding efficient natural drainage as they sometimes do here, the canals indirectly lead to the formation of the breeding places for mosquitoes. This tract is also bounded by two rivers, the Kosi and the Dhela, and the Bahella River flows through it as well as the Pathri and the Chukha *nalas*. The unhealthiness is, therefore, also due to natural conditions, such as high spring water level, a low-lying country, numerous streams and *nalas* with ill-defined banks over-grown with grass and weeds, all of which are conducive to mosquito-breeding. These natural conditions have been rendered very much worse by over-irrigation. Sufficient staff is apparently not available to supervise the maintenance of village *guls* in a satisfactory condition or to regulate the supply of water to the villages in accordance with bare necessities. Considerable wastage occurs, and surplus water is allowed to run off, filling up hollows and depressions which become mosquito-breeding grounds. In many places

> in the circle the canal *guls* run through or around the *abadi*. Canal water is used for drinking purposes and wells are neglected and breaking down."

The above bears out my criticism of copious canal irrigation in a tract naturally damp and suffering from a high water--table, and the rough and indifferent alignment of canals and water channels which are often not maintained in a proper state of repairs. It would appear that the tract is prone to be unhealthy due to its natural features but much of the unhealthiness has been accentuated and made worse by actions of man. If these contributory "man-made" factors are removed, the unhealthiness is bound to diminish.

As regards the tract west of the Dhela, the splenic index in the area to the north is below 63 per cent. while in the villages bordering the Jaspur forests in the south the splenic index ranges between 60 per cent. to 83 per cent. Captain Clyde observes :

> "Excluding half a mile belt round the jungle (which will be commented later), there would appear to be no medical reason why the area should not be prosperous, provided village irrigation channels were well constructed and an intermittent supply of water given. The three existing forest villages here are badly situated on *nalas*, there being almost no *abadi* in the two of them the sites could be easily removed."

Bearing in mind the natural conditions obtaining in the region, the problem is not of eradicating the malaria from the tract. For the matter of that even Lucknow, Cawnpore or Allahabad are not free from malaria. But malaria can certainly be controlled by taking vigorous measures against it and by persistent efforts. With the invention of the deadly insecticide—the DDT—and other chemicals, malaria can definitely be kept under control. A premanent anti-malarial organization and the continuous employment of never-ending anti-malaria measures will be necessary to keep the disease under check. In this big effort, the Army should also lend a helping hand. Only recently I read in the papers that the Army had joined hands with the Civil in Bengal and Sind to develop certain malaria-ridden tracts. I think the Director General of Resettlement and Employment, Government of India, should be approached for assistance from the Army. In the initial stages of development, the Army should be able to provide aircraft for spraying insecticides and a trained and expert anti-malaria squad to conduct necessary operations. The expenditure of money on anti-malarial work will not have gone in vain if the tract can be populated and brought under cultivation.

Anti-malaria measures

11. Specific proposals for combating malaria will no doubt be made by the expert staff, but I may make certain suggestions, based on personal experience and practical observation, which will be found useful in tackling with the problem :

(i) Land should be broken with the help of tractors to clear it of scrub jungle and over-growth. These tend to increase the unhealthiness of the tract by their very existence which encourages under-growth and dampness by preventing the sun's rays from reaching the earth. With the clearance of the grass lands and the scrub jungle, there is no doubt that considerable improvement in the health conditions can be effected.

(ii) A belt, half a mile deep should be permanently kept free of trees and tall grasses, along the boundary of the forests. The area can be utilized for grazing purposes. This is not only a protective measure against wild animals but also an anti-malaria measure. It has been ascertained that thick forests have also a pernicious effect on the climate.

(iii) A detailed survey should be undertaken to prepare a large-scale contoured map of the entire area in order to obtain levels and to assist alignments of roads, canals and drainage channels and the location of tube-wells. The survey should also undertake to make a list of canals and water channels that interfere with the drainage of the country and those which must be closed or used for drainage only. This will be particularly necessary in the tract east of the Dhela, which is low-lying and where the canals have accentuated water-logging.

(iv) In many cases water channels are badly breached and over-flowing at numerous places, often on the edges of the *abadi*. These must be attended to, and sufficient staff provided to control the supply of water for irrigation.

(v) The streams will generally need no attention but it will be necessary to construct causeways at the site of fords in order to prevent them from becoming boggy as a result of passing traffic. If the banks of a stream or drain are breached resulting in swampy conditions near about a village site, it will be necessary to brick over the banks over a certain length. These are important measures for controlling malaria.

(vi) No water channel should be permitted to run up to the edge of the *abadi* nor should it exist within 200 yards of the same. Any such existing water channel should be closed down or diverted. No building site should be approved within half a mile of a canal or water channel.

(vii) The half-mile zone round a village site should only have dry cultivation. Such crops as paddy and sugarcane should not be allowed to be grown within the zone. Scarcity of irrigation makes for the prosperity of a village but the converse of it leads to stickness and emigration.

(viii) The indiscriminate construction of dams across streams should be prohibited.

(ix) Due to high water-table, surface wells generally contain water which is contaminated by the rotting of vegetable matters. Consumption of such water is injurious to health. Hand or tube-wells should be sunk to provide water for human consumption or perhaps artesian wells could be struck as the area lies in the artesian belt.

(x) Fortunately there are no marshes or swamps in this tract. There are some depressions and burrowpits which will be filled up in the course of cultivation. Some can be levelled up during tractor-ploughing by a little extra effort. More than one tank should not be permitted in a village and that should also be sufficiently far off. Its sides should be regular and steep ; larvee-eating fish should be introduced and fishing prohibited. Large predatory fish should be removed from all tanks.

(xi) Village sites should be carefully chosen so as not to lie in proximity of a stream or on the banks of a drain or water channel or adjacent to a forest area. Inhabitation should be centralized in large villages, not in scattered hamlets, and the houses should be of mosquito-proof pattern.

(xii) In order to maintain agronomical balance large areas will have to be reserved exclusively for grazing purposes and for form ing fuel and timber reserves of the colony. Such areas should be reserved along the banks of the Kosi and the Dhela and in the north of the area to the east of the Dhela, which is comparatively speaking more damp and unhealthy.

(xiii) The running of canals should be stopped once a week for 24 hours, so as to destroy larvae.

(xiv) Quinine prophylaxis of school children should be carried out in all schools during and after the rains as a routine measure.

(xv) There must be a well-equipped hospital at Kashipur, with special emphasis on anti-malaria treatment. In addition to this, there must be a permanent anti-malaria organization for spraying DDT and other insecticides, for the treatment of water surfaces and for the continuous conducting of anti-mosquito and anti-larval operations. Motor sprays must be maintained at all anti-malarial units, distributed all over the colony.

Agricultural prospects

12. I have already referred to the inherent capabilities of the excellent and very fertile Tarai soil in my Naini Tal Tarai report, and need not dilate on it again. Almost all the crops can be grown including rice and sugarcane. The area is within easy reach of the Kashipur Sugar and Oil Mills and quite close to the Government and Civil Forests. Under the circumstances, the cultivators can easily and profitably adopt a rotation of crops which includes sugarcane and oil-seeds and also one which permits of paddy and fodder crops. Large areas available for grazing in the forests make it possible for the maintenance of a big herd of cattle for milk and milk products.

For rotation of crops, Mechanized Farming, Plan of the Farms, and System of Farming, reference may be made to the relevant paragraphs in my Naini Tal Tarai Colonization Scheme, to which I have nothing more usefully to add.

Plan of development and ultimate colonization

13. The area under investigation totals 36,724 acres, lying in one compact block north of Kashipur, on both sides of the Dhela. Almost

the enitre area is at present lying waste; the area within holdings amounting only to 2,111 acres of which only 1,054 acres is actually under cultivation. A large part of it is being used for grazing purposes. In any reclamation scheme, it is highly essential to maintain agronomical balance between agriculture, pasture lands and timber and fuel reserves. Ill-planned rural economy resulting in thoughtless extension of cultivation at the cost of grazing lands and fuel and timber reserves recoils on itself by the operation of the law of diminishing returns This tract is of great importance from the pasturage standpoint so that adequate provision must be made for it so as not to upset the economic equilibrium of the herdsmen and villages from where cattle come for grazing. Moreover, each component part of the colony must have its complement of cultivation, pasture and tree lands. In this distribution of land, however, due account must be taken of the fact that grazing and fuel and timber reserves are available in the neighbouring forests on which the colony can always rely.

The village-wise details, separately for the two blocks, east and the west of the Dhela, are given in Appendix D showing cultivated area, holdings area and culturable waste available for cultivation.

The following statement gives a synopsis of the total area comprised in what I have termed the North Kashipur Block :

Serial no.	Description of area			Holding area			Out of holdings		
			Total area	Cultivated	Uncultivated	Total	Culturable waste	Barren	Total
1	2		3	4	5	6	7	8	9
1	Under Government Cattl Farm.	East of the Dhela	6,451	21	124	145	6,036	270	6,306
		West of the Dhela	1,799	..	..	..	1,649	150	1,799
		Total ..	8,250	21	124	145	7,685	420	8,105
2	Leased out to Companies.	East of the Dhela	9,130	398	302	700	7,444	986	8,430
		West of the Dhela	837	75	51	126	540	171	711
		Total ..	9,967	473	353	826	7,984	1,157	9,141
3	Zamindari Area.	East of the Dhela	8,092	258	231	489	6,748	855	7,603
		West of the Dhela	10,415	302	349	651	9,051	713	9,764
		Total ..	18,507	560	580	1,140	15,799	1,568	17,367
4	Grand total of both the blocks.	East of the Dhela	23,673	677	657	1,334	20,228*	2,111	22,339*
		West of the Dhela	13,051	377	400	777	11,240†	1,034	12,274
		Total ..	36,724	1,054	1,057	2,111	31,468‡	3,145	34,613*

*Includes 104 acres of groves. †Includes 37 acres of groves. ‡Includes 141 acres of groves

It will appear from the above statement that three categories of land comprise the block, (i) land belonging to Government Cattle Farm, (ii) land leased out to companies, and (iii) zamindari area. I wonder if it would be possible to take over the Government Cattle Farm for purposes of cultivation and colonization. At present the Cattle Farm occupies 8,250 acres in no less than 11 villages. I do not possess much knowledge of the Cattle Farm affairs but when I was camping at Maldhan, I was told that there were only 200—300 heads of cattle. I do not think that a large stretch of land measuring 8,250 acres is being put to its best economic use by being called upon to rear 200—300 heads of cattle when a complement of 500 persons can be settled on the land. Time was when thousands of cattle were reared on the land; and perhaps it may have been all right for the times when there was no other use for the land. But if the area is to be developed and colonized, I think the Cattle Farm must yield to a human colony or its area must be seriously curtailed. I admit I am not competent to pass judgment on the matter, but I wish to make this submission for the earnest consideration of Government. If the farm is allowed to exist, it must build the fence-wall round its outer boundaries to protect the colony from the depredation of wild animals from that side.

It will further be noticed that no less than 9,967 acres have been leased out by the proprietors to certain Farming Companies floated by the Punjabees. Seth Ram Narain of the Indian Farming Company, Limited, coming from the Punjab, obtained a lease from the Raja of Kashipur in respect of Bhagwantpur, Ramnagar and Dohri Vakil villages, and is conducting land transactions with the "land hungry" people of the Punjab. The Company has made no efforts to develop the land or to carry out anti-malaria measures or to otherwise ameliorate the condition of the land and fight the malaria. The result is that ignorant people from the Punjab and other places, attracted by low rents and fertility of the soil, come, cultivate the land for a few years and overcome by incessant attacks of malaria, either quit the land or the world for ever. This does not disclose a happy state of affairs, and I think it is time that the land be taken back from the Company and developed by the State on right lines. The Company cannot be allowed to play with the lives of men and let the land deteriorate any more. Despite several years working, the land (1,784 acres) has not yet been brought under cultivation and the Company cannot be expected to make any improvement in the future. Same remarks apply to Mr. K. D. Akram (also a Punjabee) of the Kumaun Farmers, Ltd., who has taken villages Dhakia Kalan and Gangapur Goshain on lease from their proprietors. Out of 5,119 acres, only 63 acres have come under cultivation, 91 acres are lying fallow and the rest continues to lie waste. It is simply a money-making concern and does not bother itself with development of land. The Madan Union Company, Limited of the Punjab has obtained the lease of Firozpur village but has done practically nothing. The L. H. Sugar Factory of Kashipur has secured the lease of Lachhimpur Lachhi, Dhanauri and Khermasi for laying out sugarcane farms. Out of 1,864 acres belonging to these villages, only 324 acres have been brought under cultivation, 201 acres are lying fallow and the rest is culturable waste. It is apparent that the Sugar Factory has failed to develop the whole area. It is true that their programme of development has been affected by the War and the scarcity of labour. If the development of the area is started at State expense it is likely the Sugar

Mill will also be influenced to develop the area leased out to them. In addition to the above, quite a large area in Betwala has been let out to certain Punjabees.

It may also be pointed out that recently the Examiner of Capital Issues has permitted the formation of a Company called the "United Provinces Agricultural Farms Limited" with headquarters at Calcutta for developing the land and establishing agricultural farms in villages Bhagwantpur, Kundesri, Ramnagar, Garhi Inderjit and Deorhi Vakil, subject to such conditions regarding development of land and colonization as may be imposed by the Government from time to time. The Company has not started functioning as yet but I am doubtful if it will be interested in the genuine development of the country.

Twelve villages east of the Dhela comprising an area of 8,092 acres and 16 villages west of the Dhela comprising an area of 10,415 acres, constitute zamindari area in which culturable waste amounting to 15,799 acres (6,748 acres in the Eastern block and 9,051 acres in the Western block) are available for development and colonization without any other vested interest save that of the proprietor from whom the lands will have to be acquired or obtained on lease in favour of the Land Settlement Co-operative Society of the settlers.

In my opinion, the land under the Government Cattle Farm should be taken over for development and colonization and the Cattle Farm be located elsewhere or at the most a thousand acres may be left under it. This is a matter, however, on which I cannot anticipate Government decision, and leave the area from my calculations. But the area leased out to companies should definitely be taken over for the sake of the real development of the country, with the exception of the area secured by the L. H. Sugar Factory, Kashipur, for establishing their farms. Excluding the area in possession of the factory, 9,622 acres of culturable waste and 1,060 acres of barren land would be available from the category of lands leased out to companies. Added to the zamindari area that may be secured, the following are the particulars of the land that can be made available for colonization :

Land	Situation	Holdings area				Outside holdings		
		Total area	Cultivated	Uncultivated	Total	Culturable waste	Barren	Total
1	2	3	4	5	6	7	8	9
Areas leased out to Companies.	East of the Dhela	7,446	74	101	175	6,382	889	7,271
	West of the Dhela	837	75	51	126	540	171	711
	Total ..	8,283	149	152	301	6,922	1,060	7,982
Zamindari area ..	East of the Dhela	8,092	258	231	489	6,748	855	7,603
	West of the Dhela	10,415	302	349	651	9,051	713	9,764
	Total ..	18,507	560	580	1,140	15,799	1,568	17,367
Grand total ..	East of the Dhela	15,538	332	332	664	13,130	1,744	14,874
	West of the Dhela	11,252	377	400	777	9,591	884	10,475
	Total ..	26,790	709	732	1,441	22,721	2,628	25,349

On the above assumptions and calculations, the colony will comprise an area of 26,790 acres of which 1,441 acres fall in holdings of which the tenants will not be displaced safe in so far as may be necessary in the interest of compactness when fields may be exchanged according to law. The culturable waste amounts to 22,721 and non-culturable area to 2,628 acres which can be used for grazing. Out of the above, 2,721 acres culturable and 2,628 acres of non-culturable area, totalling 5,349 acres (one-fifth of the total area) may be left for grazing and other purposes and 20,000 acres be brought under cultivation. This area will be enhanced by 5,000 acres more, if the Cattle Farm is taken over.

The above area may be developed in two years, beginning with the block to the west of the Dhela which will be comparatively easier to develop, provided the stone-wall is built to keep off the animals and the Kilawali canal and its affluents are restored and improved. The lines along which development may proceed have been indicated in the Naini Tal Tarai Scheme and similar action will have to be taken in this region.

Forest

14. I am alive to the dangers attending disforestations in view of the already insufficient area under forests. But I do wish to make a mention of the Jaspur Reserved Forests. A perusal of the map will show that the forests extending down the hills across the Bhabar maintain a somewhat straight line in the south, but suddenly a block of forest juts out southward. The Jaspur Reserved Forest forms a pear-shaped appendage to the south, separating the Jaspur cultivated area from the Kashipur cultivated area. This block of forest is, therefore, harmful to cultivation on both sides of it and also adversely affects the climate of the region and the health of people living in villages on its borders. If this 'block' is removed, there will be a continuous stretch of cultivation from north of Jaspur to north of Kashipur and the menace of wild animals from that direction will also be removed. If cultivation is to develop in this area, this block of forest will have to be removed sometime or the other. There are extensive grass lands in this block and I do not think the Forest Department will be making a heavy sacrifice in surrendering it for the sake of the development of this part of the country.

Number of tractors required

15. According to plan, 20,000 acres will have to be opened up in two years. As the land will not be under crops, it will be possible to use the tractor for the greater part of the year. With a 50—60 H. P. tractor, it would be possible to do about 800 acres a year. Twelve tractors will be required for the purpose. The tractors will be used for two years only while the average life of a tractor is 6 years so that the tractors can be used elsewhere for the remaining period. At this rate only one-third of the cost of tractors should be debited to the account of the colony.

Number of settlers on the land

16. Some 20,000 acres of land will be available for actual cultivation. At 10 acres per settler, the area is capable of accommodating 2,000 settlers, with their families. In addition to ten acres of cultivated

land, the settler will also have a 2·5 acre share in pasture land, etc. As worked out in the Naini Tal Tarai Scheme, this will assure an annual income of Rs.500, and more if full advantage of the Kashipur Sugar Factory is taken, and an additional equal amount from subsidiary occupations.

Dairy farming

17. The tract is very well suited for dairy farming and my remarks on the subject in the Naini Tal Tarai report apply with equal force to this area. I have, however, suggested the establishment of a Dairy farm at Rudrapur and the question will have to be studied further whether there should be another dairy so closeby. There should be a good market for its product at Moradabad, without competing with the proposed Rudrapur Dairy, the products of which will go to Naini Tal and Bareilly. But I would defer the question for the present.

Cost of acquisition

18. It will appear from the second statement given in paragraph 13, that the area available for colonization amounts to 26,790 acres, and this is the area, which will have to be secured for the colony. Out of the above 1,441 acres fall in holdings but since the cultivator in possession will not be displaced no question of paying compensation to them arises. Of the remaining 25,349 acres, 5,208 acres belong to Raja of Kashipur, 2,826 acres already leased out to companies and 2,382 still with him. Since the companies have not carried out any work of development, I do not think any compensation need be paid to them. The matter will, however, need reference to the law officer of the Government. As regards the Raja's land, I do not think that it need be acquired. I presume that he would be willing to make a lease of his proprietary rights in favour of the "Land Settlement Co-operative Society" of the settlers. If the entire area (26,790 acres) is acquired, the cost of acquisition is estimated at Rs. 2,10,000. If, however, the area of the Raja of Kashipur is excluded, the cost of acquisition of the remaining area (21,582 acres) will be about Rs. 1,67,000. For the purpose of calculating the capital outlay, I shall presume that the area of the Raja of Kashipur will not be acquired.

Management

19. For reasons explained in the Naini Tal Tarai Scheme, it will be advisable to establish in the initial stages of development, an authoritarian management under a colonization officer who would be assisted by an Advisory Committee of the settlers in managing the colony. After the reclamation has been fully completed, the task of management can be handed over to a fullfledged Land Settlement Co-operative Society of the settlers.

I propose the following staff for the first three years of development :

	Rs.
(1) Colonization Officer at Rs. 500 per mensem ..	6,000
(2) Tractor Engineer at Rs. 200 per mensem ..	2,400
(3) Two mechanics at Rs. 100 per mensem each ..	2,400
(4) Two Farm Superintendents at Rs. 150 per mensem each	3,600
(5) A Head Clerk at Rs. 100 per mensem	1,200
(6) One Accountant-cashier at Rs. 80 per mensem ..	960
(7) Two clerks at Rs. 50 per mensem each ..	1,200
(8) One building overseer at Rs. 60 per mensem ..	720
(9) Four orderlies and peons at Rs. 20 per mensem each including dearness allowance	960
(10) One Chaukidar at Rs. 20 per mensem ..	240
(11) One office sweeper at Rs. 15 per mensem ..	180
Total ..	19,860
Residence for Colonization Officer (Rs. 7,000), Tractor Engineer (Rs. 5,000), Establishment quarters (Rs. 8,000) and Office building (Rs. 10,000) ..	30,000

Initial measures necessary for colonization

20. (i) *Public Health.*—The existing hospital at Kashipur should be improved. Besides, there should be a permanent anti-malaria organization for persistently conducting anti-mosquito and anti-larval operation and anti-malaria precautions. Anti-malaria measures will include a mobile squad with power sprays operating in the villages. The following staff will be required :

	Rs.
(1) One anti-malaria doctor at Rs. 200 per mensem ..	2,400
(2) Two malaria supervisors (malaria trained) on Rs. 80 each per mensem	1,920
(3) Two mates on Rs. 25 each per mensem ..	600
(4) Anti-malaria gang of ten men at Rs. 20 per mensem each	2,400
(5) Mistri on Rs. 60 per mensem	720
(6) Motor driver on Rs. 60 per mensem	720
(7) Anti-malaria materials and drugs	3,000
(8) Three motor sprays	1,800
(9) One motor truck	6,000
Total	19,560

	Rs.	
Residence for Doctor ..	5,000	15,000
Quarters for Establishment ..	5,000	
Office building	5,000	

(ii) *Development of land.*—It is estimated that 3,000 acres of land will require heavy clearance at Rs. 100 per acre and that 17,000 acres will require ordinary tractor-ploughing at Rs. 20 per acre. I do not make any separate estimate for filling up ordinary depressions as the cost of the same will be included in the above. The development of land will thus cost Rs. 6,40,000. Moreover, there will be recurring expenditure in keeping the "half-mile-deep belt" continuously free of grass.

(iii) *Irrigation facilities.*—(*a*) *Canals.*—Expenditure will have to be incurred in closing down some canals, in improving the others and making some new ones. Work on 30 miles of canals is estimated at Rs. 1,000 per mile.

(*b*) *Tube-wells.*—I have already expressed my preference for tube-well irrigation in the Tarai in the Naini Tal Tarai Scheme. The canals only help to over-lay the surface of an already damp country with water and thus raise the water-table and increase sickness. The tube-wells only tap the source of supply when required, at other times lying beneath the surface doing no harm. Even so, the Canal system cannot be entirely abrogated, and the tube-wells will only supplement canal irrigation. Out of the 20,000 acres to be brought under actual cultivation, it may be expected that the area will be cultivated in almost equal proportions in the two seasons. It may safely be estimated that tube-wells would not be called upon to irrigate more than 5,000 acres in one season. If one tube-well can irrigate 200 acres of land, not more than 25 tube-wells will be required.

(iv) *Drinking water.*—There will be about 2,000 families. I think provision may be made for ten tube-wells or artesian wells to supply water for human consumption.

(v) *Communications.*—I have already discussed the matter in detail in paragraph 5.

(vi) *Drainage.*—Drainage works constitute the following :

(*a*) drains in general,

(*b*) cause-ways at Fords, and

(*c*) town and village drains.

Estimates for the above are made in the following paragraph relating to capital outlay.

(vii) *Fencing.*—The matter has been examined in detail in paragraph 9.

Initial capital outlay

21. I give estimates for developing and colonizing the North Kashipur Block in the appended statement. The items of expenditure may be divided into two broad heads :

the non-repayable, and

the repayable.

Serial number	Particulars	Non-recurring expenditure— Details	Non-recurring expenditure— Amount	Recurring expenditure	Remarks
			(i) *Non-Repayable*		
			Rs.	Rs.	
1	Cost of acquisition ..	..	1,67,000		..
.2	Construction of Roads—				
	(i) Main roads (minimum)	10 miles at Rs. 30,000 a mile ..	3,00,000	3,000	..
	(ii) Branch roads ..	12 miles at Rs. 10,000 a mile ..	1,20,000	1,200	..
3	Irrigation tube-wells with water courses.	25 miles at Rs. 15,000 each ..	3,75,000	1,000	Recurring and running expenses to be borne by the cultivator.
4	Drinking water tube-wells ..	10 at Rs. 6,000 a mile ..	60,000	300	..
5	Improvement of existing irrigation works.	30 miles at Rs. 1,000 a mile ..	30,000	2,500	..
6	Drainage Works—				
	(i) Drains (general) ..	15 miles at Rs. 2,500 a mile ..	37,500	750	..
	(ii) Causeways at Fords ..	8 miles at Rs. 6,000 each ..	48,000	500	..
	(iii) Town and village drains	5 miles at Rs. 5,000 a mile ..	25,000	250	..
7	Fencing	14 miles at Rs. 4,000 a mile ..	56,000	550	..
8	Public Health	Buildings, staff and equipments	25,000	10,000	..
9	Development of land ..	..	6,40,000	50,000	The grass in the "all clear" belt will have to be periodically mowed as an anti-malaria measure. Hence recurring expenditure.

Serial number	Particulars	Details	Non-recurring expenditure (contd.) Amount	Recurring expenditure	Remarks
			Non-Repayable Rs.	Rs.	
10	Tractors and implements ..	12 outfits at Rs. 25,000 each; one-third cost debited to the account of the colony as per paragraph 15.	1,00,000	75,000 (for 2 years only).	Twelve drivers at Rs. 75 per mensem aech and 12 cleaners at Rs. 30 per mensem and ruinning charges; Rs. 5,000 per tractor, per annum for two years only.
11	Tractor workshop ..	.. ..	25,000	1,000	..
12	Management	Staff	..	20,000	..
13	Buildings	For Officers and Staff ..	30,000	3,000	..
14	Transport	2 trucks at Rs. 8,000 each with garages at Rs. 200 each.	16,400	2,400	Pay of drivers and cleaners.
		Total ..	20,54,900	1,71,450	
			(ii) *Repayable*		
	Grant for Settlers' houses ..	2,000 × Rs. 500 each ..	10,00,000	..	Expenditure will be incurred from a Government loan repaid in equated instalments including 3 per cent. terest. Maintenance charges to be borne by occupants.
		Total ..	30,54,900	1,71,450	

Estimates of returns and how far costs recoverable

22. The cost to Government is estimated at Rs. 30,54,900 recurring and Rs. 1,71,450 non-recurring. Out of the former Rs, 10,00,000 in the form of house grant is repayable. It may be recovered at an interest of 3 per cent. per annum, in half-yearly equated instalments ranging over 20 years. Each settler will have to refund Rs. 33-8 a year, which is quite reasonable.

In addition to the rent of existing tenants included in the colony, which will become payable to Government, an income of Rs. 1,20,000 a year is estimated from rents at Rs. 6 per acre and a return of Rs. 67,000 a year is expected from house instalments. The prevailing rate of rent is Rs. 6-8-0 per acre.

Cottage Industries

23. The forests of the lower hills and the sub-montane tract yield immense quantity of materials for ropes, cordage, twine, basket and matting, which can be taken up for cottage industries. There is also a good scope for manufacture of woollen articles on co-operative basis. Wool spinning and knitting has become a household occupation in the hills and the lower areas, and if a number of spinning wheels and spindles are made available, quite a profitable occupation in spare time can be assured to the settlers. Sericulture, bee-keeping and poultry can also form a useful side industry.

Summary

24. (1) The area selected for colonization lies in the north of Kashipur, on either side of the Dhela, bounded on the north by Chilkia Bhabar, on the east by the Kosi, on the south generally by the Main Tarai road and on the west by the Jaspur Reserve Forest.

(2) The tract comprises an area of 36,724 acres or roughly 60 sq. miles, lying in 49 villages, 28 to the east of the Dhela and 20 to the west. Physical characteristics and topographical conditions generally correspond to the Tarai already described in the Naini Tal Tarai Scheme except that there is no "belt of springs" and the area is perhaps not as unhealthy.

(3) The magnitude of the problem is represented by the unhealthiness of the tract, depredation of wild animals, bad communications and unscientific alignment of canals interfering with natural drainage, and necessitates the adoption of a bold policy for tackling the problem in a BIG WAY.

(4) In the area east of the Dhela, drainage is spoilt by a network of canals. Otherwise drainage is not a serious problem.

(5) Kashipur is the chief market for the area. Means of communication poor, though improvements are under way : road programme suggested.

(6) Rainfall. More than sufficient.

(7) *Irrigation.*—Canal irrigation to be curtailned and to be supplemented by tube-well irrigation. Resurrection of Kilawali canal and its affluents west of the Dhela, advocated.

(8) Tube-wells or artesian wells to supply water for human consumption. Drinking of surface water injurious to health.

(9) The place abounds with wild animals. Fourteen mile wall-fencing recommended on the forest side.

(10) The area is highly endemic. Causes for intensification of the sickness examined.

(11) Anti-malarial measures suggested.

(12) Agricultural prospects, favourable.

(13) Plan of development indicated. Out of 26,790 acres, that can be secured from zamindari area and area leased to companies, 20,000 acres to be developed in two years and brought under actual cultivation and the rest (excluding area already under holdings) to be reserved for pasture lands, etc.

(14) Jaspur Reserve Forest should be disforested and added to the colony for development of the entire area.

(15) Twelve tractors will be required for development of the land.

(16) Some 2,000 settlers can be provided with land.

(17) Dairy farming not proposed for the present.

(18) Cost of acquisition of 21,582 acres, excluding Raja of Kashipur's land, estimated at Rs. 1,67,000.

(19) Staff for the management of the colony suggested :

(20) *Initial measures necessary for colonization*—(i) *Public Health*—Existing hospital to be improved. A permanent anti-malaria organization to be set up (ii) *Development of land*—Scrub jungle and tall grasses to be cleared; (iii) *Irrigation facilities*—Some canals to be closed, and a few to be improved and some new ones to be constructed. Some 25 tube-wells proposed to supplement canal irrigation; (iv) *Drinking water*—Ten tube-wells or artesian wells to be sunk ; (v) *Communications*—A minimum of ten miles to be metalled and 12 miles of branch roads to be opened ; (vi) *Drainage*—Construction of general drains, cause-ways, and village drains suggested ; (vii) *Fencing*—14 miles of wall fencing on the forest side recommended.

(21) *Initial capital outlay*—A non-repayable expenditure of Rs. 30,34,000 inclusive of Rs. 10,00,000 of interest-bearing loan to settlers for construction of houses estimated along with a recurring expenditure of Rs. 1,71,450 a year.

(22) As against the above capital outlay, annual return of Rs. 1,20,000 from land rents and Rs. 67,000 from house instalments anticipated.

(23) *Cottage industries.*—Rope, cordage, twine and basket making, matting and making woollen articles indicated. Sericulture, bee-keeping and poultry also hold out possibilities.

APPENDIX D

Villagewise analysis of the area of the North Kashipur Block

	Serial no.	Name of village	Name of proprietor	Total area	Holdings area			Out of holdings			Remarks
					Cultivated	Uncultivated	Total	Culturable waste	Barren	Total	
	1	2	3	4	5	6	7	8	9	10	11
			Villages east of the Dhela								
Government Cattle Farm.	1	Ramjiwanpur ..	Government ..	677	..	..	..	672	5	677	
	2	Hempurdaya ..	Ditto ..	1,012	7	69	76	926	10	936	
	3	Jhagarpur ..	Ditto ..	873	..	..	..	869	4	873	
	4	Dansendiawala ..	Ditto ..	544	..	..	..	524	20	544	
	5	Garhiganj ..	Ditto ..	675	9	45	54	578	43	621	
	6	Jhanjheri	Ditto ..	418	..	..	..	405	13	418	
	7	Chandpur ..	Ditto ..	1,104	5	10	15	1,036	53	1,089	
	8	Garhi Inderjit ..	Ditto and Raja of Kashipur.	1,148	..	..	..	1,026	122	1,148	
			Total ..	6,451	21	124	145	6,036	270	6,306	
Leased out to companies.	9	Bhagwantpur ..	Raja of Kashipur ..	616	..	..	..	598	18	616	Leased out to the Indian Farming Co. Ltd.
	10	Ramnagar ..	Ditto ..	265	..	1	1	253	11	264	
	11	Dohri Vakil ..	Ditto ..	904	..	..	..	804	100	904	

	12	Dhakia Kalan ..	L. Raj Kumar and others.	4,410	63	91	154	3584	672	4,256	Leased out to Kumaon Farm Ltd.
	13	Gangapur Goshain ..	Lala Dwarkadas, etc.	709	..	..	..	682	27	709	
	14	Lachhimpur Lachhi	Raja of Kashipur ..	499	28	16	44	424	31	455	Leased out to L.H. Sugar Factory, Kashipur.
	15	Dhanauri ..	Ch. Yaspal Kunwar	636	296	185	481	125	30	155	
	16	Kharmasi ..	Syed Abdul Karim	549	..	..	..	513	36	549	
	17	Ferozpur ..	Raja of Kashipur ..	542	11		20	461	61	522	Leased out to Madan Union Co. Limited.
			Total ..	9,130	398	302	700	7,444	986	8,430	
Zamindari area.	18	Gopipura	Lala Madan Gopal ..	429	..	..	..	364	65	429	
	19	Bhogpur ..	S. Hari Singh ..	476	..	..	..	456	20	476	
	20	Pattiharu ..	Raja of Kashipur ..	259	..	1	1	157	101	258	
	21	Manpur ..	Lala Nand Kishore	692	20	49	69	593	30	623	
	22	Pachawala ..	Lala Kishorilal, etc.	1,060	65	37	102	870	88	968	
	23	Kundesri ..	Raja of Kashipur ..	1,117	..	16	16	1,018	83	1,101	
	24	Sheolalpur Dallu ..	Lala Brij Narain, etc.	702	..	1	1	648	53	701	
	25	Patti Bhajjar ..	Ch. Jagdishkunwar	252	27	..	27	201	24	225	
	26	Sitarampur ..	Ditto ..	533	17	48	65	438	30	468	
	27	Kharmasa	Raja of Kashipur	1,006	10	23	33	926	47	973	
	28	Partabpur ..	Ch. Jagdishkunwar	573	..	..	..	540	33	573	
	29	Jurka ..	Lala Kishanlal Sah	993	119	56	75	537	281	818	
			Total ..	8,092	258	231	489	6,748	855	7,603	

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9	Ganeshpur ..	Mr. S. C. Singh and others.	112	..	..	..	108	4	112	
10	Kesaripur ..	Ditto ..	286	..	..	..	277	9	286	
11	Girdha Munshi ..	Kr. Risal Singh ..	385	..	..	..	370	15	385	
12	Bharatpur ..	Mr. Jaibhagwan K. Chand.	769	117	62	179	516	74	590	
13	Sheerajpur ..	Mr. Jagat Singh, etc.	828	..	104	104	699	25	724	
14	Jagatpur Patti ..	Mr. Shanti Prasad, etc.	885	49	24	73	773	39	812	
15	Haldusalam ..	Mr. H. C. Singh ..	860	..	..	..	835	25	860	
16	Gora	Mr. Shyam Saran	328	..	..	..	320	8	328	
17	Bhawanipur ..	Mr. Shanti Prasad, etc.	634	26	47	73	542	19	561	
18	Garhi Hussain ..	C[illegible] Jai Kishen ..	368	..	..	..	352	16	368	
19	Baduwala ..	Mr. Bishambher Saran	899	86	98	184	664	51	715	
20	Tanda Bharatpur	Mr. H. C. Singh ..	387	..	..	..	379	8	387	
		Total ..	10,415	302	349	651	9,051	713	9,764	
	Under Government Cattle Farm	..	1,799	..	..	..	1,649	150	1,799	
	Leased to companies ..	..	837	75	51	126	540	171	711	
	Zemindari area	..	10,415	302	349	651	9,051	713	9,764	
	Total of the Western Block	..	13,051	377	400	777	*11,240	1,034	12,274	*Includes 37 acres of groves.
	Grand Total of both the Blocks	..	36,724	11,064	1,057	2,111	*31,468	3,145	34,613	*Includes 141 groves. acres of.

North Afzalgarh Colonization Scheme

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NORTH AFZALGARH (BIJNOR DISTRICT) COLONIZATION SCHEME FOR EX-SERVICEMEN

Situation of the area selected

THE area selected for development and colonization occupies the northern part of Afzalgarh pargana in Bijnor district. It is bounded on the north by the Kandi Sarak from Kalagarh to Dharamandi, on the east by villages Chhakamalwala and Fatehpurdhara which form the boundary of the district on the north-east, on the south by the southern boundaries of villages Kalluwala, Miranpur Modiwala, Islamnagar, Azimullahnagar, Turatpur, Nawabpura and Rasulpur Abad, and on the west by the Ramganga. The above area is demarcated on blue print map (Appendix A) attached to the report. This tract is also referred to in some official records as the area near Kalagarh or south of Kalagarh.

Brief description of the tract

2. The tract covers an area of about 37 square miles, and contains 11 villages comprising an area of 23,899 acres. It was one part of a forest tract that extended from the reserve forests in the Chandi circle on the west to those of Rehar on the extreme east. At the time of last settlement the area was included in what is called the Forest Assessment Circle, further sub-divided into groups ; the first constituting the forest villages which had been partially developed, or which were at one time partially developed but had since deteriorated; the second made up of uncultivated forest villages. I have referred to the treatment of the area at settlement (1932) in order to reveal its topographical conditions and the process of its partial reclamation from forests. From the Ramganga which forms the western boundary of the tract stretches a strip of jungle, along the northern border, which is particularly thick in the north-western belt extending from the Ramganga and gradually becomes thinner eastward. Extensive clearings have been made in this area, and in quite a number of places the cultivation is now, more or less, continuous but on the whole it is patchy. The forests are largely of an inferior character but play an important part in the area adjacent to the Ramganga in as much as they arrest the onrush of floods in the river and generally help to stop erosions and conserve the soil. They, however, exercise a most pernicious effect on the climate and give shelter to hordes of wild animals. Leaving off a sufficiently deep belt along the Ramganga, the rest of the forest will have to be removed to make way for cultivation. Clearance of the jungle for cultivation is going on intermittently, and this illustrates the confidence of the people that the area is capable of development.

The surface is generally level but is occasionally broken by the several streams and water-courses which carry off the drainage from the neighbouring hills of Garhwal and is slightly undulating in the neighbourhood of *nalas*. The slope is rapid in the north but more gentle towards the south which makes far effective drainage. The tract is malarious and unhealthy suffering from a too abundant rainfall.

difficulties of communications, and the depredation of wild animals which abound. In these physical characteristics, the tract somewhat resembles the Tarai and Bhabar of Naini Tal and will need careful treatment in the matter of development.

The soil is fertile and capable of bearing all the usual crops. Some excellent tobacco is grown, such fields often paying very high rents of Rs.15 per bigha. Most of the land is of average *siwai* (loam) class, superior in the south and the west to that in the north and the east. The channel of the Ramganga is very variable as a result of heavy floods in the river but there has generally been a westerly tendency so that the fluvial area lies mainly to the east of the stream. The soil in the valley is for the most part rich and productive but cultivation is shifting and there are wide expanses of fallow on which coarse grass spring up with great rapidity. The soil in the western part is generally moist but this is not the case elsewhere. This fact is also borne out by a study of the water-table. Water level is high enough in the western villages being, on the average, 15 feet below the surface (in Rasulpurabad it is 25 feet) but in the remaining villages the water level is 40—45 feet (in Kalluwala and Azimullahnagar, 30—33 feet). Artificial irrigation will,therefore, be of advantage in a large part of the tract.

Drainage and river system

3. The area is fortunate in having a fairly rigid slope from north to south-west which results in good natural drainage with comparatively little damage from water-logging. The principal river is the Ramganga which washes the western border of the tract. It is a considerable river, liable in the rainy season to heavy floods which cause sudden and extensive changes in its bed, factors which counteract to a great extent the excellent agricultural characteristics of its alluvial soil. It has practically no fords, even in dry weather. It is for this reason that I have suggested leaving a wide belt of forest along its bank, to be utilized for grazing and other purposes. Its eastern affluent is the Dhara, a mainly rain torrent, swollen and impetuous for more than three months in the year, and at other times dry beds of sand. No damage worth the name is caused by this streamlet. The Peelkhala flows along the south-eastern border of Chhajmalwala and Fatehpur-dhara villages and soon crosses the boundary of the colony without affecting the area to any appreciable extent. The Banaili is in the east, just outside the boundary of the proposed colony, and has no influence on the country. In addition to these, there are a few drainage channels of which the more important is the Pataria *nala* which forms the southern boundary of Rasulpurabad. But for small depressions here and there, there are no swamps or marshes in the area. The drainage is good and I do not consider any major drainage work necessary. The existing drains will have to be attended to and improved and a few *nalas* may have to be excavated to relieve whatever little water-logging exists. But on the whole the drainage will not present a serious problem to development.

Markets and means of communication

4. The principal markets for the area are Kalagarh in the north Afzalgarh in the south, Burhapura in the west and Rehar in the east. Afzalgarh has been continually declining for the last fifty years, while Rehar which was once a town of considerable importance is now nothing more than a large village.

The area is surrounded on all sides by towns of potential importance but they are hopelessly cut off from one another due to extremely poor means of communication. Bijnor is, in fact, by road one of the most inaccessible districts of the Province. The present road communications of Bijnor can only be described as deplorable. This particular area, as far as railway and metalled roads are concerned, is totally cut off from the outside world, and what this means cannot be fully realised until one has seen the unmetalled roads in the wet state which is their normal aspect for about half the year.

For a proper development of the area, the means of communication must be improved to provide outlets for the produce. The tract is very well suited for sugarcane, tobacco and paddy growing, and there must be a cheap, easy and economic means of transport. There is a sugar mill, not far off, at Dhampur to which approach must be provided. Bamboos and other forest products must similarly be exported. There is at present a metalled road from Bijnor to Sherkot *via* Kotwali, Nehtaur and Dhampur. From Sherkot to Afzalgarh and up to Kalagarh it is in a very poor condition, difficult even for bullock carts in wet weather. This road is the life-line of the area proposed for colonization and must be metalled right up to Kalagarh. The Ramganga provides a barrier. The bridge over it must be a very costly affair but it is highly necessary in the interest of the real development of the country. If the project is found impossible, there should at least be a good ferry service maintained over the river to carry the people and material across. The road mileage for metalling from Sherkot to Kalagarh will be about 20 miles. Government have already sanctioned the proposal of metalling the road up to Afzalgarh, but for the successful development of this area it is extremely essential to metal it right up to Kalagarh—another stretch of 10 miles. There is another unmetalled road from Nagina to Afzalgarh passing on to Kashipur *via* Rehar and Jaspur. In the North Kashipur Block Colonization Scheme, I have suggested the metalling of the Kashipur-Jaspur road and if this road can be further metalled up between Afzalgarh and Jaspur, it will provide a very useful highway between Bijnor and Kashipur. It is perhaps intended to metal up Afzalgarh-Rehar section next year. In view of the development of two vast tracts involved, it may be better to metal up the entire length as soon as possible. There is a project for laying out a railway line from Kashipur (*via* Rehar and Afzalgarh) to Kalagarh. This immediately makes the area under proposal more attractive for colonization of ex-servicemen. There can be little doubt that a small *mandi* will grow up at Kalagarh after the construction of the Railway. The construction of the above roads and the railway will open up the hill countries for trade contacts with the plains as also with other trading centres in the south, and will fully ensure the success of the colony.

Rainfall

5. The mean annual rainfall of the area is about 43" in the year, which is well above the average in the surrounding plain districts.

Malaria and health conditions

6. The tract is admittedly malarious but not as endemic as the Naini Tal Tarai or even the Kashipur area. The District Medical Officer of Health, Bijnor, who took the spleen census at Aligarh reports that of the 44 boys examined by him, 19 has their spleens enlarged (5,923—12,345) giving a percentage of 43·2 which is not very bad. With the invention of the deadly insecticide—the DDT—and other chemicals, malaria can definitely be keptunder control, A permanent anti-malaria organization and the unceasing employment of anti-malaria measures will be necessary to keep the disease under check. As already suggested by me in the Kashipur Colonization Scheme, the Army should also give necessary assistance as they have done in Bengal and Sind. I have already suggested certain anti-malaria measures in the North Kashipur Block Colonization Scheme, and practically the same measures will have to be adopted in the tract as well, except that we need not be as rigid in the restriction of canal irrigation.

Irrigation

7. Irrigation in the tract is, at present, negligible, being confined almost entirely to irrigation of garden and tobacco cultivation from earthen wells. In quite a large part of the area, artificial irrigation is hardly necessary in view of the inherent moisture of the soil. Even as far south as Paha (4 miles south of Afzalgarh : 7 miles from our area) in the Dhampur Sugar Mills Farm, unirrigated sugarcane, wheat and paddy is being grown with satisfactory results. However, restricted canal irrigation will be of much help in the central parts of the area and further east. If a canal is taken out of the Ramganga somewhere above Kalagarh (I think a project is already under consideration), running parallel to the Kandi Sarak eastwards towards the Dhara, a major part of the area will receive canal water. A judicious selection of the areas to be given canal water will have to be made.

Wild animals and fencing

8. Wild animals abound in the Garhwal forests above the Kandi Sarak, in the Rani Nagal Jungle to the east and in the Ramganga Khadir to the west. The greatest amount of damage is caused by the wild pig and several species of deer. I have suggested the retention of only a half-mile-deep belt of forest along the banks of the Ramganga, and the wild animals in this restricted area will soon be reduced. But the area in the north along the Kandi Sarak and in the east must be protected from the depredation of wild animals by the

construction of a wall-fence as suggested in the Naini Tal Tarai and North Kashipur Colonization Scheme. A stone-wall 4½' high, with 2 or 3 strands of barbed wire on top and one underneath the foundation to keep off the burrowing animals, re-inforced by a cactus fence, should afford sufficient protection against wild animals. It is useless having a wall on the Ramganga side for it may be swept away during floods. Moreover, the Ramganga is not fordable anywhere near the borders of the colony to admit of the wild animals coming from across it, and not many wild animals will be left in the attenduated forest along the Ramganga. The wall should, therefore, commence from opposite Kalagarh, with one-mile bend towards the Ramganga, then proceed along the Kandi Sarak and finally turn eastwards along the boundary of Chhajmalwala and Fatehpurdhara villages. The total length of the wall will be ten miles. Pill boxes or sentinel posts fortified by chaukidars, provided with firearms, will have to be built at the site of streams to shoot wild animals approaching through the gap in the wall. It may not be necessary to keep these watchmen for more than a couple of years as the animals will soon be killed or discouraged.

Agricultural prospects

9. All the usual crops can be and are grown in the area. The low-lying lands are particularly suited to rice and sugarcane. But sugarcane cultivation on a large scale cannot be profitable unless the means of communication to Dharampur, where there is a Sugar Mill are improved. May be that the Dharampur Sugar Mills may find it paying to exploit the area by extending their tram line further north from Paha. In the Paha Farm of the Sugar Mills, worked by tractors, unirrigated cane, wheat and paddy yielded 400—500, 7—10 and 5—7 maunds per acre, respectively. Yields of *lahi*, *dhania* and cotton were also satisfactory. Excellent tobacco is also grown, yielding a highly profitable return. Agricultural prospects are, therefore, quite good.

I reproduce below a note written by Mr. M. C. Corbett on the cropping system to be followed in the tract and giving an estimate of returns to the settler :

> "The area is rather distant from any sugar factory and besides the means of communication are such as not to permit of the easy transport of cane. The nearest factories to this area are Seohara and Dhampur. It is true that the Dhampur Sugar factory has a tramway service up to the borders of the area to their own farm at Paha (Azimullahnagar) but the tramway cannot cope with the cane already in the neighbourhood, hence it is very doubtful if the cane from this area can be transported by the tramway system. However, Dhampur also happens to be a good *gur* and *khandsari mandi* and a large quantity of *gur* can be made in this area. In any case, the importance of the cane crop in this area as a major cash crop cannot be established. It will be necessary to seek a substitute or depend on the cereal crops, such as wheat in the *rabi* and paddy in the *kharif*. Tobacco,

however, may be taken with advantage but in this case it will be better if the finer Virginia Tobaccos are established and arrangements are made for the flue curing of the same. So far only a few experiments have been made with this variety of tobacco, and as far as could be gathered, the crop was an unqualified success. Milk and milk products are also a possibility here because of the proximity of vast grazing lands in the nearby forests but unfortunately there is no convenient market at the present time. Poultry may do well but during the monsoon the land is inclined to be damp and the birds will probably not do well unless a thoroughly acclimatized variety is introduced.

Proposed rotations for the area—Taking as a basis a 1,000-acre plot the following distribution of areas is suggested :

	Acres
Rotation I	600
Rotation II	200
Rotation III	200

Rotation I

Fallow........Tobacco........Paddy........Wheat.......... *Sanai*.........Mustard.........

Rotation II

Paddy........Sugarcane........Sugarcane..........Sugarcane ....Ratoon..........Ratoon............*Sanai*............ Wheat..........

Rotation III

Sanai..........Wheat and Mustard..........Paddy...... Barley.. ....Linseed........

Distribution of area under Rotation I

Area	Year I		Year II		Year III	
	Kharif		*Rabi*		*Kharif*	
200	Fallow	Tobacco	Paddy	Wheat	*Sanai*	Mustard
200	Paddy	Wheat	*Sanai*	Mustard	Fallow	Tobacco
200	*Sanai*	Mustard	Fallow	Tobacco	Paddy	Wheat

So that in any one year the following crops will be on the 600 acres of land :

	Acres		Acres
Fallow	200	Tobacco	200
Paddy	200	Wheat	200
Sanai	200	Mustard	200

Distribution of area under Rotation II

Area	Year I		Year II		Year III		Year IV	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
50 Ac.	Paddy	Sugarcane.	..	Sugarcane (H).	Ratoon	Ratoon (H).	*Sanai*	Wheat
50 Ac.	Sugarcane.	(H)	Ratoon	(H)	*Sanai*	Wheat	Paddy	Sugarcane
50 Ac.	Ratoon	(H)	*Sanai*	Wheat	Paddy	Sugarcane	..	Do.
50 Ac.	*Sanai*	Wheat	Paddy	Sugarcane	..	Do.	..	(H)

Thus the distribution of area in any one year would be as under :

	Acres		Acres
Paddy	50	Sugarcane (St.)	150
Sanai	50		
Wheat	50	Sugarcane (H)	100

Under rotation III, there would be the following distribution of crops :

Area	Year I		Year II	
	Kharif	*Rabi*	*Kharif*	*Rabi*
Acres				
50	*Sanai*	Wheat	Paddy	Barley
50	Fallow	Mustard	Paddy	Linseed
50	Paddy	Barley	*Sanai*	Wheat
50	Paddy	Linseed	Fallow	Mustard

Thus in any one year we would have the following distribution of crops :

	Acres		Acres
Sanai	50	Wheat	50
Fallow	50	Mustard	50
Paddy	100	Barley	50
		Linseed	50

Thus in any single year the following crops would be distributed over the 1,000 acre blocks :

		C. O. Total							
Crops	Area	Per acre	Cost of produce	Yield per acre	Total yield	Rt./ Md.	Total	Pro.	Loss *Remarks**
		Rs.	Rs.	Mds.	Rs.	Rs. a.	Rs.	Rs.	Rs.
Fallow ..	250	..	..	..	..	..	..	..	
Paddy ..	350	60	21,000	10	3,500	8 0	28,000	7,000	..
Sanai ..	300	20	6,000	..	..	..	..	..	6,000
Tobacco ..	200	150	30,000	15	3,000	26 0	78,000	48,000	..
Wheat ..	300	80	24,000	15	4,500	10 0	45,000	21,000	..
Mustard ..	250	60	15,000	8	2,000	10 0	20,000	5,000	..
S. C. (H) ..	100	150	15,000	300	30,000	0 12	22,500	7,500	..
S. C. (St.)..	150	100	15,000	..	..	..	..	..	15,000
Barley ..	50	60	3,000	10	500	8 0	4,000	1,000	..
Linseed ..	50	60	3,000	8	400	10 0	4,000	1,000	..
Total ..	..	..	..	..	..	..	...	90,500	21,000

Remarks—Profit of approximately Rs.70,000 or Rs.70 per acre.

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From the estimates given above it is clear that the average returns expected from 1,000 acre block will be about Rs.70,000 or about Rs.70 per acre. However, it has to be noted that the tobacco crop accounts for the greatest profit and this crop is most delicate. It appears that an experiment was done in earlier times and the crop was found to be most promising. Later on, however, for some reason or the other, the experiment was abandoned. If this crop fails then the profit is washed out and a loss of Rs.10,000 is sustained. I may mention here that care is required to raise the crop and if tobacco is successfully grown arrangements should be made for curing the leaf either by the indigenous method or by the 'Flue Curing Method' which will produce a good quality of cigarette tobacco. The cane area has been kept down because of the distance of a sugar factory. The cane crop here will have to be converted to *gur* and this produce marketed."

Plan of Development and ultimate colonization

10. The following is an analysis of the total area under investigation :

Serial number	Name of mauza	Name of zamindar	Total area	Tenants holding			Waste out of holdings		Area under jungle conditions
				Cultivated	Un-cultivated	Total	Cultivated waste	Barren	
1	2	3	4	5	6	7	8	9	10
1	Rasulpur Abad	Rani Phulkunwari of Sherkot.	5,810	153	172	325	4,781	704	3,260
2	Nawab Pura ..	Ditto ..	724	1	..	1	705	18	580
3	Gularwali ..	Ditto ..	462	..	..	..	460	2	460
4	Bawli ..	Ditto ..	1,954	1	..	1	1,587	366	1,373
5	Turutpur ..	Ditto ..	1,340	..	..	..	1,331	9	1,331
6	Kalluwala ..	Kr. Nauratan Singh, *Rais*, pargana Afzalgarh.	2,214	162	8	170	1,822	222	1,170
7	Fatehpurdhara	Rai Bahadur Thakur Dan Singh, Bisht Estate.	1,833	128	46	174	1,530	129	849
8	Chhajmalwala	Ditto ..	739	75	9	84	607	48	144
9	Azimullahnagar	Deokinandan and others.	1,996	24	840	864	969	163	831
10	Islamnagar ..	(20) Zamindars	4,941	1,672	117	1,789	3,038	114	2,023
11	Miranpurmodi Wala.	Ditto ..	1,886	494	36	530	1,251	105	1,018
		Total ..	23,899	2,710	1,228	3,938	18,081	1,880	13,039

It will appear from the above that the total area available for the colony is 23,899 acres of which 3,938 acres is in the holdings of zamindars or tenants who will not be displaced save in so far as may be necessary to secure compactness by exchange of fields according to tenancy law. The bulk of the uncultivated area in holdings (about 720 acres) in Azimullahnagar belongs to the Dhampur Sugar Mills Farm, which has gone out of cultivation for want of tractors during War time and the scarcity of labour. The Mill authorities do not appear to be keen on retaining the area in this village and may relinquish it in favour of the ex-servicemen's colony, but I do not bank on this contingency in my calculations. Quite considerable clearings have been carried out in Islamnagar which represents typical forest cultivation ; vast tracts of slightly undulating wheat separated by patches of jungle from similar vast tracts lying fallow after rice. In order to give a glimpse of the countryside and to help form a mental picture of the whole tract. I have added a column in the statement, given in the beginning of this paragraph, to show area under jungle conditions in each village. It does not mean that all this area is thickly wooded, and includes extensive grass lands, openings in the *dhak* jungle and clearings once made for cultivation. Though, according to revenue records all this is culturable waste, the information given under this head helps to illustrate the extent of the clearance of jungle that will be required in the area.

Leaving out the holdings area, culturable waste amounts to 19,081 acres. A large part of it, as also of the fallow in holdings, is being used for grazing purposes. Herdsmen come for grazing their cattle from distant places. By taking up small holdings, they get free gazing for their cattle. Due to the presence of large grazing areas and the abundance of pasture, the area is well known as a breeding place for cattle which are usually of a higher stamp than those found in the districts to the south. Rasulpurabad is well-known for its bullocks. In any reclamation scheme for the tract, it is highly essential to maintain agronomical balance between agriculture, pasture lands and fuel and timber reserves. In the disposition of land account must also be taken of the presence of the latter two essentials in the neighbouring forests and the half-mile-deep forest belt to be maintained along the Ramganga. The half-mile-deep forest belt extends to a length of 6 miles, totalling an area of three square miles which is equal to 1,920 acres. Excluding this area from the culturable waste of 18,081 acres, the resultant is 16,161 acres. Of this 2,161 acres may be set apart for grazing and fuel purposes which along with unculturable land (1,880 acres) will total up to (1,920 *plus* 2,161 *plus* 1,880) 5,961 acres or between one-fourth and one-fifth of the total area available for the colony. This area should be sufficient for the purposes for which it is intended, leaving 14,000 acres for actual cultivation.

The above area may be developed in two years. The menace from the wild animals must be stopped before any agricultural operations commence. This makes it clear that the area east of the Kalagarh-Afzalpur road should be taken up for development in the first year and the area to the west of the road in the second year. The western area is more thickly wooded, and it will be better to take it up in the second phase. The lines along which development may proceed will be almost similar to those proposed for Naini Tal Tarai Colonization Scheme.

Number of tractors required

11 According to plan enunciated above, 14,000 acres will have to be opened up in two years. The working performance of a caterpillar D-6 in the Paha Farm of the Dhampur Sugar Mills is on the average 5 acres per day and that of D-7, 6·7 acres per day. Given 200 days in the year, it should be possible to break 1,000—1,200 acres

in a year. As the land will not be under crops, it will be possible to use the tractor for at least seven months in the year, from sometime in November to early in June. With a 50—60 H. P. tractor, it would be possible to do about 800 acres a year, having full regard to existing jungle conditions and other impediments. Nine tractors will be able to develop the tract for agricultural operations in two years. As the tractors will be used for one-third the period of their normal life, only a proportionate cost of tractors should be put down to the account of the colony, and the tractors can be used elsewhere for the remaining period.

Number of settlers on land

12. At 10 acres per settler, the area is capable of accommodating 1,400 settlers with their families besides village artisans and others. In addition to ten acres of cultivated land, each settler will also have a 4·3 acres share in the common pasture lands and fuel and timber reserves. As calculated by Mr. Corbett, this will assure the settler an annual income of Rs.60 a month. He could eke out his income by subsidiary occupations that he may take up, in addition.

Acquisition by State and cost involved

13. As will appear from the statement given in paragraph 10, the area that may be secured for the colony amounts to 23,899 acres. Out of the above 10,187 acre- (266 acres less in two villages Rasulpur-abad and Baoli and 163 acres more in Miranpur Modiwala) belong to Rani Saheba of Sherkot, 2,214 acres to Kr. Nauratan Singh of Rehar and 2,572 acres to Rai Bahadur Thakur Dan Singh. As regards the lands of these single proprietors, I do not think that they need be acquired. I had a talk with Rani Saheba and she was agreeable to giving a lease to the ex-soldiers colony. I presume that the other single proprietors will also be prepared to do the same. If a lease of proprietary rights is secured for the Land Settlement Co-operative Society of the settlers, I think, it will serve the same purpose which acquisition has in view. If the entire area is acquired, the cost of acquisition is estimated by the district authorities at about three and a half lakh of rupees. If, however, the area of the above proprietors is exclded, the cost of acquisition of the remaining area (8,926 acres) will be about Rs.1,53,000. For the purpose of estimating the capital outlay, I have presumed that the area of the single proprietors will not be acquired. No compensation will be given to the actual cultivators as they will not be displaced.

Management

14. For reasons explained in the Naini Tal Tarai Scheme, it will be advisable to establish in the initial stages of development an authoritarian management under a colonization officer who would be assisted by an Advisory Committee of the settlers in managing the colony. After the reclamation has been fully completed the task of management can be handed over to a full-fledged Land Settlement Co-operative Society of the settlers.

I propose the following staff for the first three years of development :

	Rs.
(1) Colonization Officer at Rs.500 per mensem	6,000
(2) Tractor Engineer at Rs.200 *per* mensem	2,400
(3) Two mechanics at Rs.100 per mensem each	2,400
(4) Two Farm Superintendents at Rs.150 per mensem each ..	3,600
(5) A head clerk at Rs.100 per mensem	1,200
(6) One Accountant-Cashier at Rs.80 per mensem	60
(7) Two clerks at Rs.50 per mensem each	1,200
(8) One building overseer at Rs.60 per mensem	720
(9) Four orderlies and peons at Rs.20 per mensem each including dearness allowance	60
10) One chaukidar at Rs.20 per mensem	240
(11) One office sweeper at Rs.15 per mensem	180
Total ..	19,860
Residence for colonization officer (Rs.7,000). Tractor Engineer (Rs.5,000). Establishment Quarters (Rs.8,000) and Office building (Rs.10,000)	30,000

Initial measures necessary for colonization

15. (i) *Public Health.*—There should be a permanent anti-malaria organization for persistently conducting anti-mosquito and anti-larval operations and anti-malaria precautions. Anti-malaria measures will include a mobile squad with power sprays opeating in the villages. The following staff will be required :

	Rs.
(1) One anti-malaria doctor at Rs.200 per mensem ..	2,400
(2) Two malaria supervisors (malaria trained) on Rs.80 each per mensem	1,920
(3) Two mates on Rs.25 each per mensem	600
(4) Anti-malaria gang of ten men at Rs.20 per mensem each	2,400
(5) Mistri on Rs.60 per mensem	720
(6) Motor driver on Rs.60 per mensem	720
(7) Anti-malaria materials and drugs	3,000
(8) Three motor sprays	1,800
(9) One motor truck	6,000
Total ..	19,560
Residence for Doctor, Rs.5,000; Quarters for Establishment, Rs.5,000 , Office buildings, Rs.5,000	15,000

(ii) *Development of land.*—It is estimated that 6,000 acres of land will require heavy clearance of jungle at Rs. 100 per acre and that 8,000 acres will need ordinary tractor-ploughing at an expense of Rs.20 per acre. I do not make any separate estimate for filling up ordinary depressions as the cost of the same will be covered under the above expenses. The development of land will thus cost Rs.7,60,000. Part of these expenses will be recovered from the sale of timber and wood. With three sugar factories working in the district, it will not be difficult to dispose off the wood. It is said that the wood may be sold for Rs.2,00,000 in these days of high prices.

(iii) *Irrigation facilities.*—I have suggested the taking out of a canal from the upper reaches of the Ramganga somewhere north of Kalagarh to run eastwards in the direction of the Dhara almost parallel to the Kandi Sarak. I do not know how far the configuration of the country will permit this and survey is necessary. The canal will however be limited by the Dhara on the east which may have to be syphoned if at all possible to carry water to the area east of it. I cannot make even a rough estimate of the cost involved in the construction of this ten-mile long canal with its water courses; but for the purposes of completing the estimate it may be put down at one lakh of rupees. I am not sure of the possibilities of tube-wells but two of them sunk by proprietors in Kalluwala and Azimullahnagar did not work probably because of rocky sub-stratum.

(iv) *Drinking water facilities.*—There are already 20 masonry wells in the area used almost exclusively for drinking purposes. Some 20 more may be constructed on the sites of habitation. Alternatively, 6 low H. P. tube-wells, if practicable, may be sunk to provide water for human consumption.

(v) *Communication.*—I have already discussed the matter in detail in paragraph 4.

(vi) *Fencing.*—The matter has been examined in detail in paragraph 8.

(vii) *Drainage.*—Drainage works constitute the following :

(i) Drains in general;

(ii) Causeways at fords;

(iii) Village drains.

Estimates for the above are given below in the paragraph relating to capital outlay.

Initial capital outlay

16. I give estimates for developing and colonizing the tract in the appended statement. The items of expenditure have been divided into two broad heads :

(i) non-repayable ; and

(ii) repayable.

Non-recurring expenditure

Serial No.	Particulars	Details	Amount	Recurring expenditure	Remarks
		(i) *Non-Repayable*			
			Rs.	Rs.	
1	Cost of Acquisition	..	1,53,000	..	
2	Construction of Roads—				
	(1) Main (Minimum).	10 miles at Rs.40,000 a mile.	4,00,000	40,000	
	(2) Branch roads.	12 miles at Rs.10,000 a mile.	1,20,000	1,200	

Serial No.	Particulars	Details	Amount	Recurring expenditure	Remarks
			Rs.	Rs.	
3	Canals ..	Headworks and water-course.	1,00,000	1,000	Recurring and running expenses to be borne by the cultivator.
4	Drinking water—				
	Tube-wells ..	6 at Rs.6,000 each	36,000	300	..
5	Drainage Works—				
	(1) Drains (General).	10 miles at Rs.2,500 a mile.	25,000	500	..
	(2) Causeways at fords.	6 at Rs.6,000 each	36,000	400	..
	(3) Village Drains.	5 at Rs.5,000 each	25,000	250	..
6	Fencing ..	10 miles at Rs.4,000 a mile.	40,000	500	..
7	Public Health	Building, staff and equipments.	25,000	10,000	..
8	Development of land.	Clearance of jungle	7,60,000	50,000	The grass in the "All-clear" belt will have to be periodically kown as an anti-malaria and protective measure.
9	Tractors and Implements.	Nine outfits at Rs.25,000 each, one-third cost debited to the account of the colony as per paragraph 11.	75,000	..	
10	Tractor Workshop.	Shed, tools and spares.	25,000	1,000 (For two years only).	For two years only.
11	Management ..	Staff ..	..	20,000 (For 3 years).	
12	Buildings	For officers and staff.	30,000	3,000	
		Total ..	18,50,000	1,28,150	

(ii) *Repayable*

Serial No.	Particulars	Details	Amount	Recurring expenditure	Remarks
	Grant for settlers' houses.	1,400 × Rs.500 ..	7,00,000	..	Expenditure will be incurred from a Government loan repaid in equated instalments including 3 per cent. interes maintenance charges to be borne by occupants.
		Total ..	25,50,000	1,28,150	

Estimates for return and how far costs recoverable

17. The cost to Government is estimted at Rs.25,50,000 recurring, and Rs.1,28,150 non-recurring. Out of the former, Rs.7,00,000 in the form of house-grants is repayable with an interest of three per cent. per annum, in half-yearly equated instalments ranging over 20 years. Each settler will refund Rs.33-8 a year, which is quite a reasonable figure. The recurring expenditure on tractor operations which will be carried on for two years in included in thecost of development of land. After the land is broken and ploughed up, there will be no expenditure on this account nor also on account of the maintenance of the tractor workshop. Moreover, the official management will cease after three years. Thus the recurring expenditure after 2 years will only be Rs.1,27,150 and after three years, Rs.1,07,150. I think it can be fairly assumed that the roads and canals will be taken over by the Public Works Department and the drainage and public health by the Public Health Department, thus considerably reducing the recurring expenditure on the colony itself.

In addition to the rent of existing tenants included in the colony, which will become payable to Government, an income of Rs.84,000 a year is estimated from land rents at Rs.6 per acre and a return of Rs.46,900 a year from house instalments. An income of Rs.2,00,000 is estimated from the sale of timber and wood, from trees cut at the time of clearance.

Cottage Industries

18. The tract is very well suited for dairy-farming, and the settlers can have quite a profitable side-business in cream, *khoa* and *ghee* making. I do not advocate the use of any big machinery to convert the industry into a large scale business, as the area is far from large towns and markets and its products may not be able to compete economically with the dairies that may be established in the future at Rudrapur and Kashipur. The question of the establishment of dairies in the sub-montane region will require thoughtful planning.

The forests of the lower hills and the sub-montane tract yield immense quantity of materials for ropes, cordage, twine, basket and matting which can be taken up for cottage industries. There is also a good scope for manufacture of woollen articles on co-operative basis. Wool spinning and knitting has become a household occupation in the hills and the lower are as and if a number of spinning wheels and spindles are made available, quite a profitable occupation in spare time can be assured to the settlers. Sericulture, bee-keeping and poultry can also form a useful side industry.

Summary

19. (1) The area selected for colonization lies in the northern part of Afzalgarh pargana, bounded on the north by the Kandi Sarak, on the east by Chhajmalwala and Fatehpur Dhara villages, on the south by the boundaries of the villages included in the proposed colony and on the west by the Ramganga.

(2) The tract comprises an area of 23,899 acres or roughly 37 square miles, lying in 11 villages which have been established in the clearings made in the jungle that once stretched from the west to the east-south of the Kandi Sarak. Physical characteristics and topographical conditions correspond to the tract north of Kashipur described in the Kashipur colonization scheme, except that the area is more wooded and the flooding of the Ramganga is a force to be reckoned with.

(3) The drainage is on the whole good due to slope of the country. No major drainage work will be necessary. A forest belt will have to be left along the Ramganga to resist erosion and to act as a shock observer against floods.

(4) The chief market for the area is Afzalgarh. Kalagarh in the north will eventually become an important market on the introduction of the railway. Means of communication are poor and will require improvement, road programme suggested.

(5) *Rainfall.*—More than sufficient.

(6) The area is malarious; anti-malaria measures on the lines suggested in the Kashipur colonization scheme, will also have to be applied to this area.

(7) *Irrigation.*—A canal taken out of the upper reaches of the Ramganga extending eastwards south of the forest road, suggested.

(8) The area abounds in wild animals. A 10-mile wall fencing suggested.

(9) Agricultural prospects favourable.

(10) Plan of development indicated. Out of 23,899 acres that can be secured for the colony, 14,000 acres may be developed in two years and brought under cultivation. The rest (excluding the area already under cultivation) to be reserved for pasture and fuel reserves.

(11) Nine tractors will be required for the development of the area in two years.

(12) Some 1,400 settlers can be provided with land for themselves and their families.

(13) Cost of acquisition of 8,926, excluding the land of single proprietors, estimated at Rs.1,53,000.

(14) Staff for the management of the colony in the intial stages of development, suggested.

(15) Initial measures necessary for colonization (i) Public Health—A permanent anti-malaria organization to be set up, (ii) Development of land—scrub jungle to be cleared, (iii) Irrigation facilities—Construction of a canal from the Ramganga, off Kalagrah, suggested, (iv) Drinking water facilities—20 masonry wells or 6 lower H. P. tube-wells suggested, (v) Communications—A minimum of 10 miles to be metalled (Afzalgarh-Kalagarh Section) and 12 miles of branch roads to be opened, (vi) Fencing—10 miles of wall-fencing on the forest side recommended and (vii) Drainage—Construction of general drains, cause ways at fords and village drains suggested.

(16) *Initial Capital Outlay.*—A non-repayable expenditure of Rs.25,50,000, inclusive of Rs.7,00,000 of interest-bearing loan to settlers for construction of houses, estimated, along with a recurring expenditure of Rs.1,28,150 to be reduced to Rs.1,26,150 after two years and to Rs.1,07,150 after three years.

(17) As against the above capial outlay, annual return of Rs.84,000 from land rents and Rs.46,900 from house-instalments and Rs.2,00,000 from the sale of wood of jungles cleared, anticipated. This, in addition to rents of existing cultivators, which will become payable to Government.

(18) *Cottage Industries.*—Dairy faming for making cream, *khoa* and *ghee* recommended. Rope, cordage, twine and basket making, matting and making of woollen articles indicated. Sericulture, bee-keeping and poultry also hold out possibilities.

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LAKHIMPUR-KHERI LAND SETTLEMENT SCHEME FOR EX-SERVICEMEN

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LAKHIMPUR-KHERI LAND SETTLEMENT SCHEME FOR EX-SERVICE MEN

Introductory

EARLY in 1945, a detailed enquiry was conducted in Lakhimpur-Kheri to ascertain the extent of genuine culturable waste in the district. The enquiry revealed the existence of large blocks of land that were lying uncultivated for some reason or the other. The Deputy Commissioner of Kheri recommended [*vide* paragraph 4(2) of his letter no. 1348/VII, dated May 24, 1945 to Commissioner] that the Mirchia and Patihan blocks (measuring 17,873 acres) in Nighasan tahsil, and Bijauli, Kusmi, Mushki, Chapartala, Andeshnagar and Paharnagar blocks (6,377 acres) in Lakhimpur tahsil should be developed by tractor ploughing and brought under cultivation. In the meanwhile Mr. T. R. Low, Additional Director of War Production brought out a Scheme for intensification of production in the district, supplemented by a note (no. 1005/XII—16, dated November 16, 1944 to Secretary, Agriculture) on the culturable waste in Kheri. I understand the scheme for the intensification of crop-production has already been sanctioned by the Government on a subsidized basis. According to Mr. Low the causes for the large expenses of land remaining uncultivated are "(*a*) lack of labour, (*b*) malaria resulting in a low and shifting population, (*c*) liability to flooding, (*d*) heavy grass covering which cannot be dealt with by bullocks, (*e*) proximity to forests resulting in damage from wild animals and (*f*) isolation and lack of communication."

In view of these serious drawbacks, Mr. R. H. Saloway, C.I.E., I.C.S., Regional Director, Resettlement and Employment, after inspecting some of the blocks came to the conclusion that soldiers' settlements should be proceeded with caution in Kheri. After discussion with the local officers he decided that Nighasan and Mohammadi tahsils, where the conditions were particularly bad should be abandoned for the present, and a beginning might be made with comparatively better areas in Lakhimpur-Kheri tahsil. He desired that the investigation should be confined to four blocks, only Bijauli, Kusmi, Andeshnagar and Kukra. Hence I concentrated on these blocks, including village Wesleypur Grant whose proprietor had separately expressed his willingness to let out land to ex-service men.

Situation of the area selected

2. The situation and the area available for colonization in the blocks selected is given in the following statement :

Serial no.	Name of block	Name of villages in the block	Situation	Area in acres
1	2	3	4	5
1	Kusmi block	Bhatpura, Wesleypur Grant, Harraiya, Dhaurera Buzurg, Handela and Kusmi.	Situated on Gola-Aliganj unmetalled road, about six miles from Gola Railway Station.	2,420

Serial no.	Name of block	Name of villages in the block	Situation	Area in acres
1	2	3	4	5
2	Andeshnagar block.	Andeshnagar, Parsehri Kalan, Tahirpur, Ramuanpur and Padaria Kalan.	On the Lakhimpur-Khairigarh unmetalled road about seven miles from Lakhimpur.	786
3	Bijauli block.	Bijwapur and Lakhaiya.	Alongside the Kheri Branch of the Sarda Canal, adjoining the Gola Farm, belonging to "Hindustan Sugar Mills, Limited". About four miles from Razaganj Railway Station.	376
4	Kukra block	Dhankha, Hardua and Jatpura.	About 1½ miles from Kukra village, and about three miles from Kukra Railway Station.	763
			Total ..	4,345

General description

3. All the above four blocks lie in isolated patches in the central belt of Lakhimpur-Kheri tahsil, from about seven miles north of Lakhimpur, on either side of the UL river, right up to almost the village of Kukra, in the north as shown in blue print map Appendix 'A'. The Andeshnagar and the Kusmi blocks are to the east of the UL and the Bijauli and the Kukra blocks are to the west of it. Lakhimpur-Kheri tahsil occupies most of the rich loam tract that crosses the centre of the district between the Kathna and the UL, but on the borders of the rivers and the *nalas*, the soil is generally sandy loam and inferior. The UL is usually taken to be the dividing line between the Uparhar and the Ganjar. Beyond it is a wild country cut up with innumerable channels, flooded during the rains, and so fever-stricken as to seriously impair agricultural effiniency. The sites selected are on either side of the UL so that the loam is generally light except in the depressions where it is clayish. Not extending further into the interior of the Ganjar, they are not seriously affected by the floods from the numerous streams. The Kukra block, however, lies in the low basin in the north, a very damp tract liable to serious water logging in wet seasons. The blocks of culturable waste selected, with the exception of Kukra, constitute, comparatively speaking, the best areas in this otherwise uninviting, intensely malarious tract, —free from water-courses, jungles and depressions. The country is generally open grass land with scattered clusters of scrub trees here and there, and a few depressions in the Bijauli block. There are no facilities of irrigation (except in Bijauli block) so essential for the development of the areas selected. Schemes for the harnessing of the available resources and the tapping of the latent ones will have to be planned out.

Markets and means of communication

4. The potentially important markets for the blocks selected are (1) Lakhimpur for Andeshnagar block (7 miles), (2) Gola Gokaran Nath for the Bijauli block (6 miles), (3) Aliganj and Gola Gokaran Nath for the Kusmi block (2½ and 4½ miles respectively) and (4) Kukra for the Kukra block. The means of communication in Lakhimpur-Kheri are extemely poor but the road system is likely to receive considerable fillip from the Post-War Reconstruction programme sanctioned for the district, which incidentally operates to the great advantage of some of the blocks selected. The Andeshnagar block lies on the Lakhimpur-Khairigarh unmetalled road which has a fair weather bridge on the Ul a couple of miles from Lakhimpur. The Hargaon Sugar Mills have made concrete tracks up to the bridge but beyond it, for four miles, the road is in a bad state of repairs. The Bijauli block—on the motorable canal bank—is a little off (3 miles) the Lakhimpur-Gola road and about four miles from the Razaganj Railway Station on the main Oudh and Tirhut Railway. Opposite the block, the road and the railway line run almost side by side. The Lakhimpur-Gola road is in the course of being metalled, and will open out the country on this side. A four-mile feeder road will connect Razaganj Railway Station and the metalled road to the Bijauli block, enabling easy transport of produce to Gola market. The Kusmi block is adjacent to the Aliganj-Gola road which is also on the way to being metalled. There is no hope yet for the Kukra block which is connected by unmetalled roads from Aliganj and Gola, both in very bad condition. Kukra block is not an eligible place for settlement, and the other blocks will eventually be well-connected.

Health conditions

5. The district is beyond doubt the most unhealthy and the most sparsely populated in Oudh. The conditions approximate to the Naini Tal Tarai but fortunately our blocks do not lie in the worst-affected part of the district—the Ganjar (comprising the Nighasan tahsil) where fevers are endemic and water is almost poisonous. In the Uparhar area in which the blocks are situated the health conditions are comparatively not so bad. Importation of non-immune population into the area generally leads to a flare-up of malaria both amongst the immigrants and the local population. It will, therefore, be very necessary to adopt anti-malarial measures on an effective scale in the colonies and the regions round-about. In the initial stages these measures will have to be undertaken on a more elaborate scale in the newly opened areas than in the rest of the district in view of the grave apprehension of ill-health amongst the immigrants. A mobile motor-spray squad will have to be maintained in each block, and a permanent anti-malarial organization will have to be set up for this part of the district. According to the present scheme of things it is considered enough to post one Medical Officer of Health in each district with the usual paraphernalia common to all districts. I do not think this is a very satisfactory arrangement. Disticts must be contra-distinguished with due regard to health conditions. The

particularly unhealthy and malarious districts should have more than the usual complement of officers, establishment, medicines and equipments. For a large, inaccessible and highly malarious district like Lakhimpur-Kheri, a single officer at headquarters is clearly inadequate. I make this submission for whatever it may be worth for the consideration of the Government. In addition to the health staff and organization at Lakhimpur, I think it is necessary to have an independent or a subsidiary anti-malaria organization at Gola Gokaran Nath. The northern half of the tahsil is more malarious than the southern, and contains Gola Gokaran Nath, a renowned place of pilgrimage. The subsidiary staff and organization at Gola will not only look after the health of the pilgrims in the abnormal situation created by the immensely fluctuating population of Gola, but will also make a more sustained and intensive effort to control malaria and other diseases in the areas, that may be opened out for development and settlement in that part of the country. It is only after an organized and big effort that the areas can be made habitable with some confidence amongst the settlers.

In order to give a picture of the present conditions the following particulars culled from the recent malaria survey reports of Rai Sahib Dewan Chand, Assistant Malaria Officer to Government, are given :)

Serial no.	Name of block	Number of children examined	Splenic index	Degree of enlargement 0	1	2	3	4	5	5-A	Number of blood films examined	Parasite index	Remarks
			Per cent.									Per cent.	
1	Kusmi ..	34	61·7	13	2	3	7	5	4	..	26	11·5	Hyper-endemic.
2	Andeshnagar	26	61·5	10	3	5	5	0	2	1	20	5	Ditto.
3	Bijauli ..	No habitation in the block.											
4	Kukra ..	19	47·3	10	1	4	1	3	..	..	21	9·5	Highly endemic.

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Hospital Statistics (showing percentage of malaria to total attendance)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Lakhimpur Hospital ..	9·3	6·0	7·1	6·1	5·0	4·8	6·3	6·9	8·7	19·8	20·6	18·0
Gola Dispensary	12·27	12·41	14·6	12·7	10·7	9·7	10·3	12·4	15·9	28·8	19·3	13·8

NOTE—Malaria present throughout the year; incidence highest, September to December.

Rainfall and water levels

6. Calculated over forty years, the annual rainfall works out at 41" but in the quinquennium (1940—44) it was 46" which is fairly

copious. At this time of the year, the water-table is 7 feet below the surface in the Kusmi and Kukra blocks and 7—13 feet in the Andeshnagar block which contains both high land and a long depression. It is evident that the water-table is quite high.

Wild animals

7. The district is a well known shooting ground and the fauna, both in the Government as well as in the *Zamindri* forests, is extremely varied. Game birds are in abundance and all the species of wild animals are to be found in forests which are spread all over. In the forest areas which have been brought under the plough, the animal that cause damage to crops are pigs, monkeys, barking deer, *chital*, *nilgai* and *sambhar*, as also hogg-deer (*parha*) in the more damp places. Pigs are most numerous and probably the most destructive of all the wild animals. Experience, however, tells that they are swamped away by the advancing cultivation. With the opening of the countryside and growing habitation, their numbers are bound to be reduced. A liberal grant of arms licences to the settlers will be great help in controlling the mischief. I do not think any particular protective measure (viz. wall fencing) is required.

Irrigation

8. During the last two decades there has been marked increase in canal irrigation by the opening up of the Sarda Canal system in 1928-29. For the purposes of this report the question has to be examined with particular reference to the blocks selected for soldiers' settlement. There are no irrigation facilities in the Andeshnagar block, nor can canal water be taken there due to natural impediments. The existing wells in the area have ample supply. Tube-wells offer the only possibility, and three of these will be quite sufficient for the area. The other alternative is to sink a very large number of masonry wells—perhaps 50. I prefer the Diesel oil tube-wells if hydel is not available. Through the Bijauli block runs the Kheri Branch of the Sarda Canal and water can be distributed by constructing a few water channels. Kukra is a water logged area, and not suitable for settlement. The extensive Kusmi block offers a problem. It lies on the left bank of the Ul, where there is no canal system. Kusmi block extends over the western fringe of the tract known as the Ganjar, which is cut up by innumerable water-courses which are flooded during the rains rendering the whole region intensely malarious. There is no prospect of extending the canal irrigation in this part nor is it desirable in view of its inherent dampness, but there is one hope for these villages lying on the outer border of the Ganjan area, a project which has been examined in some detail in the course of the examination of the Kusmi block in paragraph 11(1). The Kheri branch runs on the other side of the Ul —a mile or so away—but I am not sure if it could be siphoned across the Ul which is liable to floods during rains. The best plan appears to be to impound the water of the Ul near Wesleypur Grant where there

are some natural escapes, and to canalize the water southward across the Kusmi block. Planning for irrigation is necessary for the proper development of the tract.

Agricultural prospects

9. The soil is on the whole light loam except in the depressions, where it tends to be clayish. The soil responds favourably to careful cultivation and good manuring. Like all Tarai soils, the various agricultural operations must be carried out well in time, else the crops may come to grief. The land is well-covered with wild vegetation and patches of scrub jungle, with thatching grass in low-lying portions. This bespeaks of the fertility of the soil. In the cultivated areas, good crops of sugarcane, paddy, wheat, pulses, and other crops usual to the plains can be obtained. In some places, quite large areas are under chillies of a particularly big variety. All the blocks selected adjoin big farms belonging to Hargaon and Gola Sugar Mills, where extensive cultivation of sugarcane is being done on improved lines, and it is only natural to presume that the sugarcane will also be the favourite of the settlers who will take full advantage of the existence of two sugar factories in the neighbourhood. Agricultural statistics obtained from the Pipra Farm opposite Andeshnagar block speak for themselves regarding potentialities of the soil. The farm comprises some 2,800 acres of which about 400 acres are under roads, buildings, grass land, etc. The farm is irrigated by nine tube-wells, and what was once a shooting place is now a smiling farm. Under irrigation facilities and green manuring conditions, planted sugarcane yielded 700 maunds per acre, wheat 24 maunds an acre, potatoes 125 maunds and garlic 40 maunds an acre. Due to shortage of labour, interculture could not be given to onions which came to about 60 maunds an acre. Without irrigation and manuring, 16·10 maunds of gram per acre were gathered. The possibilities are apparent but in developing the chosen area irrigation will play an important factor.

Rotation of crops and annual income to the settler

10. In view of the above special circumstances, Mr. M. C. Corbett, Divisional Superintendent of Agriculture, has suggested an elaborate plan (reproduced below) of rotation of crops, giving an idea of the annual return to the settler :

> " The land can grow all manner of crops according to the circumstances and the demands, Since all the areas selected fall near sugar factories and the lands are capable of giving food crops of cane, it stands to reason that a rotation with cane occupying the key position in the rotation should be introduced. However, since the colony must be self-sufficient, the area cropped must also yield foodgrain and fodder. The following rotations suggest themselves :

I—*Sanai* (G. M.)—Sugarcane(plant)—Sugarcane (Ratoon)——*Sanai* (G. M.)—Wheat.
II—Fallow—Sugarcane (plant)—Sugarcane (Ratoon)—Paddy.
III—*Juar*—Bareley—E. Paddy—Gram—Maize—Oats.
IV—*Juar*—Gram—Paddy—Barley.

It is true that in those rotations where cane does not appear the money returns will not be great, but as I have mentioned above, some area will have to be set aside for fodder and food production. It may, however, be found advantageous to reduce or increase the percentage of the areas under the different rotations thus putting more land under rotation I and less under rotations III and IV or *vice versa*, according to the exigencies of the conditions and circumstances prevailing. In case all the four rotations are to be introduced and continued in the colony, the area would be distributed, somewhat like this—under rotation I 40 per cent. of the area, under rotation II 35 per cent. of the area, under section III, 15 per cent. of the area and under rotation IV, 10 per cent. of the area. The actual position in the case of a 750-acre plot is given below. Since the Andeshnagar block happens to be about this size, the plan placed below may be applied to the same. Necessary adjustment and proportions may be fixed for the other plots at Bijauli and Kusmi :

The Andeshnagar block—750 acres

Three hundred acres would be under rotation I and the area-statement would be as follows :

		Year I		Year II		Year III		Year IV	
	Field no.	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1	75	*Sanai*	S. Cane	..	Ratoon	..	*Sanai*	..	Wheat.
2	75	Cane	Cane (H).	Ratoon	Harvest	*Sanai*	Wheat	*Sanai*	Cane.
3	75	Ratoon	Ratoon (H).	*Sanai*	Wheat	*Sanai*	Cane	..	Cane (H).
4	75	*Sanai*	Wheat	*Sanai*	Cane	..	Cane (H).	..	Cane (H).

so that in any one year the area distribution would be as follows :

Crop	Area	Expenditure per acre	Total expenditure	Income (Total)	Returns	
	Acres	Rs.	Rs.	Rs.	Rs.	Rs.
Sanai ..	150	10	1,500	..	—1,500	
Cane (H) Plant ..	75	200	15,000	39,375	..	24,375
Ratoon ..	75	125	9,375	26,250	..	16,875
Wheat ..	75	75	5,625	15,000	..	9,375
Cane (St.) ..	225	100	22,500	..	—22,500	..
			Total	..	—24,000	50,625

On 300 acres a gross income of Rs.26,625 = Rs.89 per acre.

Rotation II 2·5 acres

Field number	Area	Year I		Year II		Year III	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1	65·6	Fallow	S. Cane	S. C. (H)	..	..	S. Cane (H).
2	65·6	S. Cane	S. Cane (H).	S. Cane	S. C. (R)	Paddy	S.Cane.
3	65·6	S. C. (R)	S. Cane (R).	Paddy	Peas	S. Cane	S. Cane.
4	65·6	Paddy	Peas ..	Fallow	S. Cane	..	S. C. (R).

The area statement in this case would be as follows :

Crop		Area	Expenditure per acre	Total expenditure	Total income	Retuns	
						—	
		Acres	Rs.	Rs.	Rs.	Rs.	Rs.
Fallow	..	65·6	10	656	Nil	—676	..
Sugarcane (St.)	..	202·5	100	20,250	Nil	—20,250	..
Sugarcane (H)	..	65·6	200	13,120	35,438	..	22,319
Sugarcane (R)	..	65·6	125	8,200	16,781	..	8,581
Peas ..	..	65·6	50	3,280	5,400	..	2,120
Paddy	..	65·6	30	1,968	5,750	..	4,782
				Total	..	—20,925	37,802

On 262·5 acres a gross income of Rs.16,877 or Rs.64·5 per acre.

Crops Area		Year I		Year II		Year III	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
I	.. 37·5	*Juar* ..	Barley	Paddy	Gram ..	Maize ..	Oats.
II	.. 37·5	Paddy	Gram ..	Maize ..	Oats ..	*Juar* ..	Bar.
III	.. 37·5	Maize ..	Oats ..	*Juar* ..	Bar. ..	Paddy	Gram.

Abstract :

Crop		Area	Expenditure	Total expenditure	Total income	Returns	
						—	+
		Acres	Rs.	Rs.	Rs.	Rs.	Rs.
1 Juar	..	37·5	30	1,125	..	—1,125	..
2 Barley	..	37·5	50	1,875	3,600	..	1,725
3 Paddy	..	37·5	40	1,500	3,750	..	2,250
4 Gram	..	37·5	40	1,500	3,000	..	1,500
5 Maize	..	37·5	40	1,500	..	—1,500	..
6 Oats	..	37·5	40	1,500	..	—1,500	..
					Total ..	—4,125	5,475

112·5 acres 1350 Per acre Rs.12

Rotation IV. Area 75 acres

Field	Area	Year I				Year II			
		Kharif		*Rabi*		*Kharif*		*Rabi*	
.1	37·5	*Juar*	..	Gram	..	Paddy	..	Barley	
2	37·5	Paddy	..	Barley	..	*Juar*	..	Gram	

Abstract:

Crop		Area	Expenditure	Total expenditure	Total income	Returns	
						—	+
		Acres	Rs.	Rs.	Rs.	Rs.	Rs.
Juar ..	..	37·5	30	1,125	..	—1,125	
Gram	..	37·5	40	1,500	3,000	..	1,500
Paddy	..	37·5	40	1,500	3,725	..	2,225
Barley	..	37·5	50	1,875	3,600	..	1,725
			Total	..	..	—1,125	5,450

75 acres. Rs.4,325 Rs.57-10 per acre.

Dividing up the four rotations proportionately, we obtain the following figures :

Acres	Rs.	Rs. per acre		Proportion	Rs. a.
300	26,625	87-14 per acre	..	4·0	351 8
262·5	16,877	64-8 per acre	..	3·5	225 12
112·5	1,350	12 per acre	..	1·5	18 0
75·0	4,325	57-10 per acre	..	1·0	57 10
750·0	49,177	65			652·14

From the above returns, the average returns per acre come out to Rs.65. This figure has been arrived at from the following calculations:

40 per cent. of this area is under rotation I giving a return of Rs.9 per acre.

35 per cent. of this area is under rotation II giving a return of Rs.64·5 per acre.

15 per cent. of this area is under rotation III giving a return of Rs.12 per acre.

10 per cent. of this area is under rotation IV giving a return of Rs.57-6 per acre.

It is quite clear that if only rotations I and II and IV were introduced the average return per acre would be much greater, but as has been said before due consideration must be given to the maintenance of soil fertility and the production of fodder and grain.

The annual income of a cultivator having a ten acre holding would, therefore, be about Rs.650. This, of course, is in the nature of a profit or bonus. In addition to this, if the colonists work in their colony they will naturally earn the wages which will be paid for rearing of the, crops and the live-stock and each colonist will have his own kitchen garden and perhaps his own milk animals and the produce will add to his income.

It can be plainly seen that the first rotation is the most remunerative and yields the highest income. However, it is more economic and in accordance with agricultural practice to distribute the rotations because by so doing, a balance of both foodgrain and fodder crops are grown and work can be distributed more easily.

It will be noticed, however, that where green manure has been taken or where fodder crops have been grown, the whole crop has been considered as a dead loss and the amount spent on it has been put on in the minus column. This does not express a real value because the fodder crop in its turn will yield an income in milk or meat-production and the green manure crops will yield a money value which has already been accounted for in the cost of production of next crop.

The same proportionate distribution of areas will be made in the case of the other blocks of land in this area, namely, Bijauli and Kusmi. Naturally the most economic and most paying rotation would be taken provided this is in the interests of the cultivators and of the maintenance of land fertility.

The area-distribution of land would be somewhat as follows :

—	Andeshnagar	Bijauli	Kusmi
	Acres		
Rotation I	300	160	1,000
Rotation II	262·5	140	875
Rotation III	112·5	60	375
Rotation IV	75·0	40	250

Brief description of the blocks selected

11. As against the common back-ground of the general features of the district having a material bearing on the selected areas, as also the irrigation and agricultural potentials of the blocks concerned, a brief description of the blocks selected may be given. Sketch map (Appendix B)* delineating all the selected blocks on one sheet gives a bird eye-view of the four blocks as they exist on the site. They are large grass tracts with clumps of scrub jungle and small clusters of trees here and there. They are mere bushes or remnants of old groves which can easily be cleared. The Bijauli block, however, possesses slightly undulating surface with a number of small ponds. An idea of the ponds and bushes can be had by a glance at the sketch map (Appendix B)*

The statement, given below, gives an analysis of the total area of the villages comprising the blocks, and of the culturable waste available for development and soldiers' settlement.

सत्यमेव जयते

								Rs.	a.
1. Kusmi	Bhatpura ..	587·25	529·30	59·71	19·87	441·95	7·77	1,167	1
	Wesleypur Grant.	2637·61	500·00	39·9	51·35	439·12	5·54	1,564	0
	Harraiya ..	770·20	467·10	44·62	53·91	347·28	21·29	6,053	4
	Dhonera Buzurg.	976·20	976·02	164·31	90·42	679·81	41·48	12,143	4
	Handela ..	748·30	661·41	1·59	123·70	503·94	321·8	4,962	0
	Kusmi ..	242·41	242·41	37·90	178·34	7·99	181·8	3,706	12
	Total ..	5961·52	3376·24	312·12	517·59	2420·09	126·44	29,696	5

Name of block	Names of villages	Total area of the villages (acres)	Area which falls inside the block (acres)	Included in holdings		Culturable waste, available for development	Barren	Compensation to zemindar for acquisition
				Cultivated	Uncultivated			
1	2	3	4	5	6	7	8	9
2. Andeshnagar	Andeshnagar	600·00	600·00	1·00	16·00	573·00	10·00	4,743 12
	Parsehri Kalan	72·00	72·00	..	..	72·00	..	570 0
	Tahirpur ..	235·00	235·00	60·00	137·00	37·00	1·00	2,016 0
	Padaria Kalan	12·00	12·00	..	..	12·00	..	108 0
	Ramuanpur	81·00	81·00	..	..	81·00	..	727 8
	Total ..	1000·00	1000·00	61·00	153·00	775·00	11·00	8,165 4
3. Bijauli.	Bijwapur ..	267·8	267·8	..	..	254·86	12·22	330 6
	Lakhaiya ..	200·56	109·33	..	..	100·90	8·43	157 1
	Total ..	467·64	376·41	..	..	355·76	20·65	487 7
4. Kukra.	Dhankha ..	782·54	90·80	..	6·20	84·60	..	140 14
	Hardua ..	892·54	433·42	..	13·62	411·1	8·79	1,020 6
	Jatpura ..	1198·44	372·29	7·71	95·95	267·67	0·96	4,183 10
	Total ..	2873·52	896·51	7·71	115·77	7632·8	9·75	5,344 14
	GRAND TOTAL	10302·68	5649·16	380·83	786·33	4314·13	167·84	43,694 2

It will appear from the above statement that by far the largest block available for colonization is the Kusmi block consisting of part of the areas of six villages. If 829·71 acres in the holding of cultivators only 312·12 acres are cultivated, and 2420·09 acres represent the culturable waste (outside holdings) awaiting development. Bijauli block has completely gone out of cultivation, and one can see signs of villages that exist no more. Andeshnagar block has very little cultivation. In the Kukra block also there is but nominal cultivation (7·71 acres), The Kukra block is thoroughly spoiled by the Barauncha Nala that flows almost through its centre, receiving water from a large depression in the Mailani forests. Almost parallel to this *nala* runs a drainage channel constructed by the Irrigation Department, which has interfered with the internal drainage. In the result, the whole has become a completely water-logged area, in which no settelment is possible. Eliminating Kukra block 3,551 acres are available for development and colonization.

It auguers well for these areas that two big sugarcane farms exist contiguous to the blocks in question. The Pipra farm belonging to Hargaon Sugar Mills stretches just near he Andeshnagar block while the Gola Farm of the Hindustan Sugar Mills Ltd., Gola, lies between the Kusmi and the Bijauli blocks. Both these farms are in prosperous condition, and, though mainly concerned with the growing of sugarcane, they raise other crops as well including wheat and paddy. If these farms flourish, there is no reason why those of the prospective colonists should not. They serve as beacon lights to settlers to come, develop and settle.

Kusmi block (I).—The Kusmi block comprises an area of 3376·24 acres belonging to villages Bhatpura, Weselypur Grant, Harraiya, Dhonera Buzurg, Handela and Kusmi, out of which 2420·09 acres will be availabe for colonization. I do not take into consieration 829·71 acres that are included in cultivator's holding and, though the major part of it is lying fallow, cannot be made available without displacement of tenants. In this respect, Lakhimpur-Kheri is akin to Jhansi. where usually large holdings are held by cultivators who are not in a position to cultivate the whole of it. As regards this "dog-in-the-manger" policy, I have made a proposal for Government's consideration in my report on the Jhansi Land Settlement Scheme in the Kans-infested lands. Until the matter is finally decided by the Government, the existing tenants' holdings must be excluded from our calculations.

The villages falling in the block are owned by a number of zamindars, Hindus, Muslims and Christians. Wesleypur Grant is owned by Claxton family. I met Mr. Claxton at his residence and he expressed his eagerness to settle some ex-servicemen in his land. He has already got the land demarcated in *chaks* and offered 500 acres of land for the settlement of ex-servicemen on a graduated scale of rent determined by the progress of development. He does not want to charge more than the legal rent and will be willing to accept rent at circle rates. In view of this, I do not consider it necessary to acquire his land. As regards the other zamindars, I think acquisition will have to be resorted to in the interest of the development of the tract.

Agricultural development of the tract is dependant on irrigation. There are three possibilities : (1) extension of the existing Kheri branch, (2) damming the Ul and taking a canal out and (3) tube-well. As regards the first, the Kheri Branch flows on the wrong side of the Ul so far as this tract is concerned. Water can perhaps be brought over this side by means of an acqueduct across the river, but this is for the Irrigation Department to say. I examined a site for building a dam near Wesleypur Grant on the river Ul. Though a layman, I thought that the site was a good one for building a dam. Just near this place, , there are a series of depressions which could be submerged without injury to anyone, and the overflow could escape by a natural high level channel to rejoin the Ul a little down below through the Kedwar depression. The water will be impounded during the rains when there is a surplus so that there will be no interference with the rights lower down. By impounding the surplus, perennial supply can, in my opinion, be obtained, and a canal taken out southwards towards Kusmi and I think as far down as Muskhi block. I attach a sketch map (Appendix C) showing what I think can be done in the matter of building a dam. If irrigation could be secured, it should be possible to extend the colony down to the Mushki block where 284 acres of culturable waste are available (Mushki 114, Basantipur 63 and Bharkaunda 107). The last alternative is to have a number of tube-wells, say, 8 or 9. The Gola Farm close by is irrigated by tube-wells which seem to be well suited to the land. I am sure the Irrigation Department can prepare a suitable scheme for irrigating this area which otherwise is quite fit for agricultural operations.

Som trouble may be apprehended from wild animals but that can easily be brought under control once the land is broken up and brought under settlement. Flooding occurs occasionally, but it is localized and no serious damage occurs.

Andeshnagar block (II).—The Andeshnagar block includes 1,000 acres lying in villages Andeshnagar, Parsehri Kalan, Tahirpur, Ramuanpur and Padaria Kalan. Of the above 775 acres are available for settlement. The soil is mostly a light loam of inferior quality but can be made productive. The area lies on the right bank of the Kandwa Nala which forms its northern boundary. A southern tributary of the Kandwa, called the Kathna, runs through Andeshnagar from west to east and finally joins the Kandwa after skirting it on the south-east. The area is thus encompassed on two sides by *nalas*, but the bed of the tributary is silting up and is gradually being brought under cultivation. It appears practicable to close up one *nala* altogether and to train the other into an effective drainage channel. This will be necessary in the interest of the development of the tract. On the eastern side there is a long shallow depression which can be converted into an excellent paddy-growing area. Higher up towards the deserted site of Andeshnagar the soil improves and is fertile but irrigation is the bane of the tract. There is no canal system nearby, and the only way of providing water is through tube-wells. No elaborate survey for the installation of tube-wells is necessary as they have already been proved to be a success in the Pipra Farm, closeby, in which a number of tube-wells are working. The area of the Farm under actual cultivation is 2,400 acres which is commanded by nine tube-wells. Due to the porosity of the soil, percolation is excessive, and the area commanded by one tube-well ranges between 150—180 acre. In order to increase the commanded area *pucca* channels are necessary. In my opinion, the area can be commanded by three tube-wells which can pay their way. Means of communication will require a little improvement by metalling four miles of the Khairigarh road from the bridge near Lakhimpur to Andeshnagar. Acquisition will not be difficult as the area is under the superintendence of the Court of Wards. I discussed the matter with the Special Manager who is agreeable to the grant of a long lease for ex-soldiers' settlement as an alternative to acquisition.

Bijauli block (III).—The Bijauli block contains an area of 376·41 acres lying in villages Bijwapur and Lakhaiya, out of which 355·76 acres are available for colonization. The Kheri branch is at hand and bution. The land on both sides of the canal is low-lying and the surface is undulating which is an impediment to the spread of the water. On going through the land, I found a few old water channels still existing following the contour of land but the area served appears to have been limited by the wavy configuration of the land. The place was populated once and quite a prosperous country it is said to have been ; but a Faqir's curse fell on the people and the land went to rack and ruin. I have, however, a different reason to tell. From map (Appendix B) it will appear that there are a number of depressions in the block featured by its ponds and tanks. The place remained populated until the advent of the canal water but once the water came and filled up these depressions, lying in the course of water channels, dampness increased, mosquitoes bred to abundance, in consequence, and the malaria took its heavy toll. The bad treatment of the tenants by the zamindar was also a contributory factor. If the area is to be developed again, careful precautions against the above defects will have to be tken. The land will require a certain amount of levelling and the depressions will have to be filled up. The breaking of the land will be done by tractors which can be utilized for the levelling and filling work also. Surface water is not fit for human consumption and will have to be drawn from deeper sources by means of hand pumps. The block is a good one for development. The successful running of the Gola Farm, which adjoins the block ensures full agricultural development to this area. The block possesses good means of communication in the Oudh and Tirhut Railway line and the Lakhimpur-Gola road that is being metalled. A feeder road to Razagan Railway Station—4 miles away — will connect the whole area.

Kukra block.(IV).—The Kukra block comprises 896·51 acres, belonging to Dhankha, Hardua and Jatpura villages, out of which 123·48 acres are included in cultivators' holdings (only 7·71 acres being under cultivation) and 763·28 are available for development. The area is intersected by the Barauncha Nala and a drainage channel and an embankment built by the Irrigation Department, and these between them have rendered the whole area waterlogged, at places definitely boggy. ' The jor ' which is the name given to a long depression which receives water from the Mailani forest also passes through the block. As a result of water-logging, larger areas are covered with a wild grass called ' khar ' which is a pernicious weed producing broom-stick, and rapidly over-runs a field lying fallow. These stretches of ' khar ' as well as the Government forests known as Oudh forests harbour wild animals which do much damage. If a settlement were to be attempted here, the whole area will have to be reconstructed, the drainage channel re-aligned, the embankment shifted and the Barauncha Nala trained. This is likely to be a costly affair, and in the absence of these essential works of development, I cannot advise settlement by ex-servicemen.

Settlement prospects

12. The drawbacks from which the undeveloped parts of the district suffer have already been enumerated in the opening praragraph of the report. The danger from flooding, depredation of wild animals

and lack of means of communication are, however, not a serious menace to the development of the blocks selected. For breaking up the grass-covered land, levelling the undulations, filling up the depressions and clearing whatever scrub jungle exists, tractors will be required and they will be useful in opening up the country. To meet lack of labour, immigration and labour-saving devices are necessary. Tractors with implements for carrying on the various agricultural operations will greatly aid the solution of the problem. For the improvement and extension of the irrigation facilities, suggestions have already been made, which, if they are acted upon, will conduce to the general development and prosperity of the tract. The real menace is from malaria, which must be ruthlessly fought in an organized manner by the establishment of a permanent anti-malarial organization and the adoption of all requisite anti-malaria measures. If the development proceeds on these lines, settlement prospects can be made very bright. The flourishing farms of the several Punjabis and of the Gola and Hargaon Sugar Mills are sufficient to give assurance of the development of the country, and incidentally of the mechanized mode of farming. The selected areas can be converted into excellent sugarcane tracts, and the settlers will find no difficulty in disposing of their sugarcane to the Gola and Hargaon Sugar factories. Agricultural prospects have been examined at length in paragraphs 9 and 10 and found favourable. Kukra block has been ruled out for settlement purposes, and in the remaining blocks not more than 300 ex-servicemen can be accommodated. Lakhimpur-Kheri is not one of the heavily recruited districts but it may not be difficult to find the above number of persons fulfilling the qualifications required of an Army settler. If the requisite number of ex-servicemen if not forthcoming, there will be no difficulty in finding a small number of men from Gorakhpur and other eastern districts.

Number of ex-servicemen who can be settled

13. A reference to the statement sub-joined to paragraph 11 will show that in the three blocks finally selected, 3,551 acres of culturable waste are available for settlement. There are ample forests all round to serve as grazing land and to provide timber and fuel; even so the colony must make its own provision for the above to some extent. Some 551 acres of land may be set apart for the above purposes, leaving 3,000 acres, for agricultural purposes, pure and simple. This area can be augmented further by 250 acres (out of 284 in Mushki block) if the irrigation project suggested in paragraph 11(i) materializes. The principle of allotting 10 acres per settler has already been approved in other schemes. A 10-acre unit will assure a monthly income of at least Rs.52-8 per settler, as discussed in paragraph 10, and this is quite reasonable. On this basis, it is possible to settle at least 300 ex-servicemen in the various blocks or 325, if Mushki block is included.

Acquisition by State and cost involved

14. In order to develop the land on right lines and make it habitable and fit for agricultural purposes, it will have to be acquired. Essential capital outlay will prove too large for the purse of the ordinary

zamindars. Moreover, as Mr. Saloway has aptly put it, the owners are lackadaisical-taluqdars on whose promises to let out land to ex-soldiers little reliance can be placed." With this view, I and the Deputy Commissioner of Kheri also concur. It does not, however, appear necessary to acquire 500 acres of land in Wesleypur Grant, that Mr. Claxton is willing to let out to ex-servicemen. He is keen on the rehabilitation of the tract and will not offer any obstacles. It may also not be necessary to acquire the Andeshnagar area that falls under the superintendence of the Court of Wards. The Special Manager is agreeable to execute a long lease or a permanent lease in favour of ex-servicemen on reasonable terms.

The total area for acquisition (excluding Kukra block) according to column 5 of the statement sub-joined to paragraph 11 is 4,753 acres. This also includes tenants' area and barren area but they lie scattered within the blocks and cannot be eliminated. The cultivators will not be displaced except in so far as may be absolutely necessary in the interest of compactness which can be ensured by exchanges of plots according to law. The cost of acquisition as calculated by the Deputy Commissioner is given below :

	Rs.	a.
(1) Kusmi block	29,696	5
(2) Andeshnagar block	8,165	8
(3) Bijauli block	487	7
Total ..	38,349	4

If the Wesleypur Grant area (cost of acquisition estimated at Rs.1,564, and the Andeshnagar block are excluded, the cost of acquisition of the remaining area will be Rs.28,620. This does not include compensation to tenants as they will not be displaced.

Status of settlers

15. The status of settlers in Crown land will be that of occupancy tenants. In case a lease of proprietary rights is granted to a land settlement co-operative society under Chapter XI of the United Provinces Tenancy Act (e.g. in the case of Court of Wards' land in Andeshnagar block), the settlers will have hereditary rights. The same status will be enjoyed by the settlers who hold directly from the zamindars as in the case of proprietary land in Wesleypur Grant, if it is not acquired.

System of farming

16. After development, the land can be brought either under a State Farm or parcelled out amongst the settlers for farming in accordance with co-operative principles. The State Farm will enable the Government to recover part of the expenses incurred over the capital outlay but that would result in considerably delaying the rehabilitation of ex-servicemen. If the process of settlement is delayed by a couple of years or so, there will be no ex-service personnel to settle as they will have in the meantime, been absorbed in some peaceful avocation or taken to dissipation with no money left for agricultural pursuit or they will have joined the gang of outlaws. I prefer sooner resettlement of these men to state farming, and the Government finances will not suffer as receipts will commence

in the form of land rents. As already suggested in other land settlement schemes, I prefer co-operative farming and the establishment of a land settlement co-operative society on the lines adumberated by Sir Malcolm Darling, Colonization Officer to the Government of India.

Plan of development and ultimate colonization

17. The area for development and colonization lies in three blocks, Kusmi, Andeshnagar and Bijauli. The latter two are comparatively small blocks, and the work of reclamation can be started simultaneously in all the three blocks. Irrigation survey should be started at once to find water for Kusmi and Andeshnagar blocks as suggested in paragraph 11 or as may be considered best by the irrigation experts. Tube-wells may be sunk in the Andeshnagar block. Successful working of the same can, with confidence, be assumed from the experience gained of tube-wells working in the Pipra Farm just on the other side of the road. If irrigation facilities are assured, breaking of land with tractors should commence as soon after the monsoon as possible, say, sometime in October-November. Side by side with breaking of land in the Bijauli block, levelling of undulating parts and filling up of depressions should also be carried out. Fortunately the area is not wooded, and the clearance of a few clusters of scrub trees can be done in the course of breaking the land. The area to be levelled is not large ; I estimate it at a hundred acres. The Public Health Officers should adopt such anti-malaria measures as they consider necessary, and an anti-malaria organization should be set up at Gola as recommended elsewhere. Hand pumps should be sunk in Kusmi and Baijauli blocks to provide water for human consumption from the lower recesses. The feeder road to Razaganj Railway Station should be constructed. This is by far all that is required in the matter of development.

Management

18. For the initial stages of development, which should not last for more than three years, I suggest the following staff :

	Rs.
(1) One manager at Rs.300 a month	3,600
(2) Three unit managers at Rs.100 a month each .. (Inspectors from the Agriculture Department).	3,600
(3) One tube-well engineer at Rs.200 a month ..	2,400
(4) Three tube-well mechanics at Rs.100 a month each ..	3,600
(5) Clerical establishment—	
(i) one senior assistant at Rs.75 a month ..	900
(ii) one cashier at Rs.50 a month	600
(iii) one junior assistant at Rs.40 a month ..	480
(6) Five orderlies and peons at Rs.20 a month, including dearness allowance	1,200
(7) One office chaukidar at Rs.20 a month including dearness allowance	240
(8) One sweeper at Rs.15 a month	180
Total ..	16,800
Quarters for staff and establishment	15,000

Tractors

19. Two tractors will be required for Andeshnagar block, one for Bijauali and four for Kusmi block to break the land. I make no provision for the tractor outfits, or staff for the purpose, in view of the

Government scheme for subsidized breaking of land in Kheri in which part of the ploughing expenses will be recovered from the cultivators in easy instalments. Out of the tractors already ordered for Kheri 7 will be utilized for the development of the selected blocks in the first year.

Initial measures necessary for colonization

20. (i) *Public Health*—For the anti-malaria organization suggested for establishment at Gola, the following staff and equipment is recommended :

	Rs.
(1) Anti-malaria officer at Rs.200 per mensem	2,400
(2) Three malaria trained supervisors at Rs.80 per mensem each	2,880
(3) Two mates at Rs.25 per mensem each	600
(4) Eight gangmen at Rs.20 per mensem each including dearness allowance	1,920
(5) Three motor sprays	2,000
(6) Medicines	2,000
Total ..	11,530
Quarters for officers and establishment	6,000
GRAND TOTAL ..	17,530

As the above anti-malaria organization will not be for the exclusive benefit of the colonies alone, the cost should not be debited against the colony. The above should be a part of the general scheme for the amelioration of conditions in the malarious districts as suggested in paragraph 5. The above is only a modest estimate for the territory round about Gola and the part of Lakhimpur-Kheri Tahsil where the clolonies lie. For the administration of a bigger area, the estimates will have to be substantially increased in consultation with the Director of Public Health.

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(ii) *Development of land*—I do not take into account the cost of breaking the land, which is planned on a subsidized basis, part of the expenses being recovered in instalmetns from cultivators. Levelling of 100 acres and filling up of depressions in Bijauli block is estimated to cost Rs.10,000 at Rs.100 per acre. Training of *nalas* in Andeshnagar block may cost Rs.3,000.

(iii) *Facilities of irrigation*—Nothing can be said in respect of the cost involved in damming the Ul in the Kusmi block and taking out a canal therefrom. Since, however, the whole of that part of the country stands to benefit from the project the costs cannot be tacked on to the colonies alone.

In the Bijauli block the repairing of the existing water channels and making of a few more may cost Rs.2,000. The area is small.

Three tube-wells in the Andeshnagar block will cost Rs.45,000 at Rs.15,000 per tube-well including 22 H. P. engine, pump, material, boring, buildings, and fittings and cost of building water-courses.

(iv) *Drinking water*—Hand pumps will be required to provide water for human consumption in Kusmi and Bijauli blocks for which a provision of Rs.20,000 may be made.

(v). *Communications*—Only two items have been suggested. The opening of a feeder road from the Razaganj Railway Station to Bijauli is estimated to cost Rs. 20,000 at Rs.5,000 per mile and of a metalled road from Ul bridge near Lakhimpur to Andeshnagar—4 miles—at a cost of Rs.1,00,000 at Rs.25,000 a mile. It is not necessary to metal the feeder road.

Initial capital outlay

21. (*a*) *Housing*—As already approved by the Government in other schemes, a recoverable grant of Rs.500 may be made to each settler for building a mosquito proof house for himself according to approved design. This would entail investment of 300 × 500 =Rs.1,50,000 for 300 settlers. The amount may be recovered at an interest of 3 per cent. per annum, in 40 half-yearly equated instalments, i.e. in a period of 20 years. Each settler will have to refund Rs.33-8 per year, which is quite fair and reasonable.

(*b*) *Bullocks and implements*—As in other schemes, the settler should provide himself with these from the deferred pay and gratuity he will receieve on discharge.

Estimates of return and how far costs recoverable

22. *Non-repayable*—

	Rs.	
(*a*) Cost of acquisition	38,350	If entire selected area is required.
(*b*) Development of land	13,000	
(*c*) Health measures	Nil,	Being part of a general scheme
(*d*) Irrigation facilities	47,000	
(*e*) Cost of management..	16,800	A year.
(*f*) Quarters for officers and establishment ..	15,000	For the first 3 years
(*g*) Drinking water facilities	20,000	
(*h*) Communications	1,20,000	
Total ..	2,70,150	

Repayable—

	Rs.
Construction of houses	1,50,000
Total ..	4,20,150

Additional 3,000 acres of land will be brought under cultivation. Calculating at the existing circle rates, an annual return of Rs.10,000 is expected from land rents. But after the provision of irrigation facilities, the rates will go up at least by one-third enhancing the income to about Rs.13,300. In addition to this the house instalments will bring in Rs.10,050 a year.

Cottage industries

23. *Gur*-making, paddy-husking and weaving of mats and tatties hold out some possibilities.

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Cattle breeding

24. With its extensive forests and grazing grounds, Kheri forms an important cattle-breeding district. Large numbers of draught bullocks, chiefly of the Parehar breed are exported to other districts. The settlers can profitably take up cattle-breeding and stock-raising.

Summary

25. (1) Earlier enquiries made by a Special Officer in regard to culturable wastes in Kheri and by Mr. Saloway about possibilities of soldiers settlement and a scheme for intensification of production prepared by Mr. T. R. Low led to the present detailed investigations for colonization of ex-servicemen in elected blocks.

(2) Situation and the areas of blocks investigated.

(3) The selected blocks lie on either side of the Ul on the edge of the Parehar tract, dividing it off from the Ganjar tract. Soil light loam, and land grass covered with small clusters of scrub trees, and slightly undulating soil in Bijauli block.

(4) The blocks are connected with important towns and markets in the neighbourhood—Lakhimpur, Gola Gokaran Nath and Aliganj. Means of communications, so far as the selected blocks are concerned, are improving and fair.

(5) Health conditions : Highly malarious. A permanent anti-malarial organization needed, as also adoption of anti-malaria measures.

(6) Rainfall adequate, and water table high.

(7) Wild animals in abundance, but the development of the country will reduce numbers.

(8) Irrigation facilities non-existent except in Bijauli block. Canalization in Kusmi block and sinking of tube-wells in the Andeshnagar block necessary.

(9) Agricultural prospects favourable. Sugar mill farms adjacent to each block flourishing.

(10) Rotation of crops suggested and annual return to settler estimated at about Rs.54-8 per month.

(11) Selected blocks described in brief, separately.

(12) If developed on the lines indicated, settlement prospects favourable.

(13) About 300 ex-servicemen can be settled on 10-acre unit basis, or 325, if Mushki block included.

(14) Cost of acquisition estimated at Rs.38,350 if the entire area is acquired ; Rs.30,185 if Andeshnagar block taken on lease from the Court of Wards instead of being acquired and Rs.1,564 further less if Mr. Claxton allowed to let out his land in Wesleypur Grant to settlers, instead of its being acquired.

(15) Settlers to enjoy occupancy status in Crown land and hereditary status in leased land.

(16) System of farming : Co-operative farming by settlers preferred to State farming.

(17) Plan of development : (*a*) all the three selected blocks to be tackled simultaneously, (*b*) survey of irrigation possibilities—canalization in Kusmi and sinking of tube-wells in Andeshnagar, (*c*) breaking of land by tractors including the task of levelling uneven lands and filling up the depressions in Bijauli block, (*d*) estalishment of a permanent anti-malarial organization and adoption of the usual anti-malarial measures, (*e*) installation of hand pumps, to provide water for human consumption from about 200 feet below the surface, (*g*) construction of a feeder road from Razaganj Railway Station to Bijauli and a metalled road from the Ul bridge near Lakhimpur to Andeshnagar.

(18) Managerial staff costing Rs.16,800 a year suggested for the first three years of development. Quarters for staff and establishment to cost Rs.15,000.

(19) Seven tractors required to break the land.

(20) Initial measures necessary for colonization : (1) *Public Health* : A permanent anti-malarial organization at an annual expense of Rs.11,530 with buildings, for officer and staff costing Rs.6,000 for the general good of all the people in that part of the country —an expenditure not apportionable to the colonies alone :

	Rs.
(2) *Development of land*	13,000
(3) *Facilities of irrigation*	2,000

over minor work and over tube-wells Rs.45,000. Damming of the Ul and construction of a canal from the reservoir for the general good of the countryside—cost not debitable to the colonies alone, and

	Rs.
(4) *Drinking water*	20,000
(5) *Communications*	1,20,000

(21) *Initial Capital Outlay*—(*a*) Housing—Rs.1,50,000 at Rs.500 granted to each settler as loan, (*b*) bullocks and implements to be provided by the settler himself.

(22) Estimates of returns and how far costs recoverable :

None-repayable—

	Rs.	
(*a*) Cost of acquisition	38,350	If entire selected area acquired.
(*b*) Development of land	13,000	
(*c*) Health measures	Nil.	Being part of a general scheme.
(*d*) Irrigation facilities	47,000	
(*e*) Management	16,800	A year for the first three years.

		Rs.
(*f*) Quarters for officers and establishment	..	15,000
(*g*) Drinking water	..	20,000
(*h*) Communications	..	1,20,000
Total	..	2,70,150
Repayable—		
Construction of houses	..	1,50,000
GRAND TOTAL	..	4,20,150

Additional 3,000 acres under cultivation will fetch an annual income of Rs. 13,300 from land rents. House instalments will bring in Rs. 10,050 a year.

(23) *Cottage industries*—*Gur*-making, paddy-husking and weaving of mats and *tattis* indicated.

(24) Cattle-breeding hold out possibilities of eking out extra income.

RADHA KANT,
Officer on Special Duty
(Colonization), Civil Secretariat,
United Provinces.

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APPENDIX III

Mr. F. H. Hutchinson's note of the " First Stage of Development of Collective Farms in the Tarai and Bhabar Government Estates."

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REPORT BY F. H. HUTCHINSON, ESQ., I.S.E., CHIEF ENGINEER, EASTERN CANALS, UNITED PROVINCES, PUBLIC WORKS DEPARTMENT, IRRIGATION BRANCH, ON THE FIRST STAGE OF DEVELOPMENT OF COLLECTIVE FARMS IN THE TARAI AND BHABAR GOVERNMENT ESTATES

Introductory

On March 29, 1946, I received a message from Pandit Govind Ballabh Pant, that he would like to see me in order to discuss the possibilities of growing more food in the Tarai and Bhabar Estates. I had an interview with him the same evening and a result I wired Mr. Bowder, Superintendent, Tarai and Bhabar Estates, to see me in Lucknow. I also called in Mr. Russell, who has been a previous Superintendent, Tarai and Bhabar Estates and who has already prepared an elaborate scheme for collective farms in the Estates.

2. I explained that arrangements had been made to survey an area of approximately 120,000 acres both from the air and by our usual methods and that I expected that the results of the survey would be available in the near future.

3. I pointed out that the Tarai and Bhabar Estates are controlled by the Board of Revenue and that in my capacity as Chief Engineer, Eastern Canals, I merely supply technical personnel. He asked me to draw up a complete scheme including the organization suggested for dealing with the cultivation of a large area in the Estates.

4. I have consulted Mr. Moss, War Production Commissioner, Rai Sahib Radha Kant of the Resettlement Department, who has also prepared a detailed scheme for the colonization of the Tarai, and Mr. Imam of the Agriculture Department. In addition I have obtained advice from Kunwar Balbir Singh who has also been a Superintendent of the Tarai and Bhabar Estates.

Organization

5. The present organization in the Tarai and Bhabar Estates is shown by the following diagram :

Board of Revenue
Deputy Commissioner

Superintendent, T. B. Estates. | S. F. O. | A. D. M. | C. M. O. H.

6. I suggest that the ultimate objective should be the development of collective farming in an area of at least 120,000 acres and that a strong organization should be formed from the start, as unless the work is tackled with great determination, the difficulties which will be encountered in the Tarai will not be overcome.

7. It is suggested that in order to ensure the co-ordination of all the numerous departments who are at present working within the limits

of the Estates, it would be advisable to form a Committee of Management consisting of the following :

(1) President of the Managing Committee, Tarai and Bhabar Collective Farms.	Deputy Commissioner, Naini Tal.
(2) Civil Engineering representative	Superintendent, Tarai and Bhabar Estates.
(3) Forest Department representative.	Special Forest Officer, Tarai and Bhabar Estates.
(4) Agriculture Department representative.	Deputy Director of Agriculture, Bareilly.
(5) Co-operative Department representative.	Assistant Registrar, Bareilly.
(6) Public Health Department representative.	Chief Medical Officer of Health, Tarai and Bhabar Estates.
(7) Animal Husbandry Department representative.	Deputy Director, Veterinary Services, Bareilly.

8. It is suggested that this Committee of Management should undertake the work in addition to their present duties, without additional remuneration. It would probably be necessary for the Committee to function for at least five years , after which it should be possible to elect representatives from amongst the settlers to form a permanent Managing Committee.

9. For executive work on the farm, the following organization is suggested :

(1) Director of Collective Farms.	If possible, he should be a Colonel with wide experience of military farms.

(2) The following representatives of the various departments would be subordinate to the Director of the Collective Farms. Their work would, however, be inspected periodically by one or other of the members of the Managing Committee in order to ensure that technical details are being dealt with efficiently.

(i) *Agriculture Department*—An Assistant Director for dealing with seed, manure, rotation of crops and farm operations. It is possible that an ex-service man who has had experience of military farms would prove more suitable than a member of the Agriculture Department.

(ii) *Civil Engineering Department*—An Assistant Engineer from the Irrigation Branch of the Public Works Department for dealing with Drainage, Irrigation, Roads, Buildings and Water Supplies.

(iii) *Forest Department*—An Extra Assistant Conservator for dealing with—

(*a*) supplies of timber:

(*b*) fuel.

(*c*) all Forest produce.

(*d*) plantation.

(iv) *Public Health Department.*—A U. P. P. H. S. Assistant or preferably an ex-serviceman who has had experience of anti-malarial measures in Burma for dealing with—

(*a*) medical facilities.
(*b*) anti-malarial measures.

(Some of the officers whom I have consulted think that it would be advisable to have two officers, one for dealing with medical facilities, and another for dealing with anti-malarial measures. I am personally of the opinion that one officer with a strong staff of subordinates should be sufficient as I am only visualizing a labour staff of 1,250 men for the present.)

(v) *Animal Husbandry Department*—(*a*) A U. P. V. S. Class II officer or preferably an ex-serviceman, who has had wide experience of handling supplies, for dealing with the sale of all produce.

(*b*) A U. P. V. S. Class II officer or preferably an ex-service Veterinary officer for dealing with—

(i) livestock purchases and sales,
(ii) Veterinary- hospitals.

Plan of campaign

10. All the officers with whom I have had discussions are of the unanimous opinion that an attack on the Tarai must be Government's responsibility in the first instance, and that only after adequate anti-malarial measures have been taken and land has actually been brought under cultivation, should collective farming be introduced. Plan no. I is an index map showing the area in which I recommend that operations should be started. It is suggested that a town should be constructed at Rudrapur and that operations should extend towards the north, west and east.

11. All are unanimous in recommending that officers should be appointed on or about July 1, and that labour should commence operations from October 1, 1946. It is not advisable to introduce labour into this area before that date.

12. The first target should be to sow 3,000 acres of *rabi* followed by 3,000 acres of sugarcane, followed by 6,000 acres of rice. In the second year the *rabi* area should be increased to 6,000 acres, sugarcane to 6,000 acres and rice retained at 6,000 acres making a total of 18,000 acres under crops by September, 1948.

Powers of sanction

13. If success is to be attained, it is essential that quick decisions should be made. It is, therefore, suggested that powers to sanction detailed estimates against the project provision which has been made in this estimate should be given to—

(a) The Director	Upto Rs.1 lakh.
(*b*) Deputy Commissioner, Naini Tal	Full powers.

Execution of Work

14. For execution of work it is suggested that—

(*a*) one of the Grade A units consisting of 250 men which have been organized by Mr. Moss should be employed for dealing with bull-dozers, tractors, lorries, workshops, etc. They might also be allotted a portion of the work in connexion with fencing ;

(*b*) a Grade B unit of 1,000 men should be placed at the disposal of the Director ;

(*c*) Engineering works might be done partly by means of one or other of the labour units or by contract at the discretion of the Director.

Drainage

15. All existing drainages will have to be improved. This class of work should be entrusted to the Engineering representative. Country slopes are good and there should be no great difficulty in improving the present drainage arrangements.

Irrigation

16. This project does not provide for any irrigation arrangements. Some use could, however, be made of the existing canals but there is little doubt that eventually it will be advisable to restrict irrigation to tube-well irrigation. The present dams and regulators which have been constructed from small reservoirs, which will be extremely difficult to deal with in connexion with anti-malarial measures and I visualize that ultimately it will be necessary to dismantle all existing bunds and regulators and leave the drainage lines to function without any obstruction. In certain doabs it may be found advisable to construct canals fed by means of water from tube-wells and in other doabs it will probably be advisable to introduce irrigation by means of individual tube-wells. Each doab will have to be treated on its merits and a separate irrigation project prepared when surveys have been completed. It is anticipated that reasonably satisfactory yields can be obtained in the area selected by means of dry-farming. The forecast for Gross Receipts has been based on the assumption that for the first three years only dry-farming will be undertaken.

Fencing

17. Mr. Radha Kant in his scheme has suggested the construction of a wall along the north portion of the area which is to be tackled. I am personally of the opinion that the most satisfactory arrangement will be to adopt the standard type design for fencing with reinforced concrete posts which has been in vogue in the Tarai and Bhabar Estates for many years and to fence each large plot of land as it is dealt with. I have very little faith in a single wall along the north boundary. No hard and fast rule can be laid down for the size of the plots which are to be fenced as the size of each will depend on the configuration of the country. I recommend that no major drainage line should be crossed by a fence.

Capital Expenditure (Appendix I)

18. Appendix I shows the Capital Expenditure required to bring 18,000 acres under cultivation. It amounts to Rs.87,09,000. In preparing this Appendix I visualize the construction of permanent residential quarters for the staff. Details of all permanent buildings suggested are given in Schedule A. Only temporary quarters have been provided for labour. The construction of permanent houses for settlers would come in the second stage of development.

Gross Receipts (Appendix II)

19. Appendix II shows the Gross Receipts anticipated for the years 1946-47, 1947-48 and 1948-49. The totals are as follows :

1946-47	Nil.
1947-48	23,59,500
1948-49	36,07,500

Working Expenses (Appendix III)

20. Appendix III shows details of Working Expenses. During 1946-47 they are estimated at Rs.12,21,300 and during 1947-48 and subsequent years Rs.31,33,500.

Financial Forecast (Appendix IV)

21. Appendix IV shows the Financial Forecast for the first three years of working. It shows that by the end of 1948-49, there will be a loss of Rs.21,14,360. In return for this loss Government will have brought 18,000 acres under cultivation at a cost of Rs.117 per acre.

Budget Forecast (Appendix V)

22. Appendix V is a Budget Forecast for the first three years of working under the headings :

(a) Capital Expenditure.

(b) Gross Receipts.

(c) Working Expenses.

During the year 1946-47, a sum of Rs.67 lakhs would have to be found for Capital Expenditure and Rs.12·2 lakhs for Working Expenses.

General

23. I recommend that a campaign on the lines suggested in this report should be launched from October 1, 1946, and that from April 1, 1949, settlers should be installed in the areas which have been brought under cultivation. The settlers would be formed into a Co-operative Society and farming would be undertaken on a Collective basis. The main organization under the Director of Co-operative Farms would farm in areas for which settlers have not been found and in addition would undertake the development of the area west of the Dhimri *Nadi*.

24. If a scheme such as the one which has been outlined in this report is undertaken, I visualize 120,000 acres of the Tarai and Bhabar Estates being brought on to a collective-farming basis at the rate of 10,000 to 20,000 acres per year.

F. H. HUTCHINSON,

LUCKNOW :
April 4, 1946.

Chief Engineer (*E*),
Irrigation Branch, Public Works Department,
United Provinces.

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APPENDIX I

Proposed Collective Farming Scheme, Tarai and Bhabar Government Estates

Statement of capital Expenditure

Serial no.	Particulars	Quantity	Rate	Expenditure		Remarks
				Non-recurring	Recurring	
1	2	3	4	5	6	7
				Rs.	Rs.	
1	Roads (main) metalled	13 miles	50,000 per mile	6,50,000	6,500	
2	Roads (branch) *kachaha*	50 ,,	3,000 ,,	1,50,000	5,000	
3	Town roads, *pakka*	6 ,,	20,000 ,, ,,	1,20,000	1,200	
4	Tube-wells and pumps (for drinking water) ..	30 no.	10,000 each.	3,00,000	30,000	
5	Drainage works	60 miles ..	6,000 per mile	3,60,000	6,000	
6	Town drainage and sanitation	15 ,,	8,000 ,,	1,20,000	750	
7	Anti-malarial measures	..	L. S.	1,50,000	1,00,000	
8	Hospital and dispensary (with equipment and staff quarters).	1 no.	1,50,000 each	1,50,000	20,000	
9	Veterinary Hospital (with equipment and staff quarters.	1 ,,	20,000 ,,	20,000	5,000	
10	Temporary village housing	1,250 ,,	500 ,,	6,25,000	Nil	(To be maintained by labour units.)

11	Residential quarters, with office and farm buildings (*vide* Schedule A).	..	..	10,84,000	50,000	
12	Workshops (3 portable and 1 permanent) ..	4 no.	1,00,000 each	4,00,000	40,000	
13	Fencing	150 miles.	5,000 per mile	7,50,000	3,000	
14	Tractors and implements	60 sets	30,000 each	18,00,000	Nil	Provided for in Appendix no. 3.
15	Bull-dozers	4 no.	60,000 ,,	2,40,000	Nil	
16	Lorries	50 ,,	10,000 ,,	5,00,000	Nil	
17	Carts	200 ,,	200 ,,	40,000	Nil	
18	Dairy cattle	250 ,,	500 ,,	1,25,000	Nil	
19	Draught bullocks	900 ,,	250 ,,	2,25,000	Nil	
20	Seed and manure	18,000 acres	50 per acre	9,00,000	Nil	
			Total ..	87,09,000	2,67,450	

APPENDIX II

Statement of Gross Receipts

Serial no.	Particular	Quantity no.	Rate	Number of months	Amount	Remarks
	1946-47					
	Nil ..	..	..	..	..	Receipts will accrue from the next year.
	1947-48					
1	Sale of milk ..	No. 250	Rs.30 per month	8	60,000	
2	Sale of calves	75	Rs.100 each ..	..	7,500	
3	Sale of *rabi* crop	Acres. 3,000	Rs.100 per acre	..	3,00,000	
4	Sale of *bhusa* ..	3,000	Rs.24 per acre	..	72,000	
5	Sugarcane ..	3,000	Rs.300 per acre	..	9,00,000	
6	Rice ..	6,000	Rs.100 per acre	..	6,00,000	
7	Rice *bhusa* ..	6,000	Rs.20 per acre	..	1,20,000	
8	Vegetables ..	600	Rs.500 per acre	..	3,00,000	
			Total	..	23,59,500	
	1948-49 and subsequent years					
1	Sale of milk ..	No. 250	Rs.30 per month	8	60,000	
2	Sale of calves	75	Rs.100 each ..	..	7,500	
3	Crops ..	Acres 18,000	Rs.180 per acre	..	32,40,000	This figure is based on the 5-year crop rotation on page of Mr. Russel's report.
4	Vegetables ..	600	Rs.500 per acre	..	3,00,000	
			Total	..	36,07,500	

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APPENDIX III

Proposed Collective Farming Scheme, Trarai and Bhabar Government Estates

Statement of Working Expenses

Serial no.	Post	Number	Rate of pay	1946-47		1947-48 and subsequent year	
				Number of months	Amount	Number of months	Amount
	(1) Director of Collective Farms' Establishment						
			Rs.		Rs.		Rs.
1	Director, Collective Farms.	1	1,500	8	12,000	12	18,000
2	Accountant ..	1	120	8	950	12	1,440
3	Head Clerk ..	1	100	8	800	12	1,200
4	Clerks	4	75	3	2,400	12	3,600
5	Clerks	3	60	8	1,440	12	2,160
6	Peons	4	30	8	960	12	1,440
			Total	..	18,560		27,840
	(2) Agriculture Department						
1	Manager, Collective Farms.	3	400	8	9,600	12	14,400
2	Farm Superintendents	18	80	5	7,200	12	17,280
3	Clerks	3	60	8	1,440	12	2,160
4	Peons	4	30	8	960	12	1,440
5	*Kamdars* ..	90	40	5	18,000	12	43,200
			Total	..	37,200		78,480
	(3) Civil Engineering						
1	Assistant Engineer	1	400	8	3,200	12	4,800
2	Overseers ..	5	120	5	3,000	12	7,200
3	Mates	5	30	5	750	12	1,800
4	Clerk	1	60	8	480	12	720
5	Peon	1	30	8	240	12	360
6	Dafadar ..	1	35	5	175	12	420
7	Barkandazes ..	4	33	5	660	12	1,584
			Total	..	8,505		16,884

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Statement of Working Expenses—(contd.)

Serial no.	Post	Number	Rate of pay	1946-47		1947-48 and subsequent years	
				Number of months	Amount	Number of months	Amount
			Rs.		Rs.		Rs.
	(4) Forest Department						
1	Extra Assistant Conservator.	1	300	8	2,400	12	3,600
2	Range Officers ..	4	120	5	2,400	12	3,600
3	Foresters ..	4	50	5	1,000	12	5,760
4	Forest guards ..	16	30	5	2,400	12	5,760
5	Clerk ..	1	60	8	480	12	720
6	Peon	1	30	8	240	12	360
7	Peons	4	30	5	600	12	1,440
			Total	..	9,520		20,040
	(8) Public Works Department						
1	Health Officer ..	1	600	8	4,800	12	7,200
2	Clerk	1	60	8	480	12	720
3	Peons	2	30	8	480	12	720
4	Peons	2	30	5	300	12	720
5	Inspector of Health	6	120	5	3,600	12	8,640
6	Sub-Assistant Surgeon.	1	120	5	600	12	1,440
7	Compounders ..	8	50	5	2,000	12	4,800
8	Sweepers ..	20	30	5	3,000	12	7,200
9	Water Carrier ..	1	30	5	150	12	360
10	Inspectors mates ..	6	30	5	900	12	2,100
			Total	..	16,310		33,960

Statement of Working Expenses—(contd.)

erial no.	Post—Particulars	Number	Rate of pay	1946-47		1947-48 and subsequent years	
				Number of months	Amount	Number of months	Amount
			Rs.		Rs.		Rs.
	(6) Animal Husbandry						
1	Marketing Officer ..	1	300	8	2,400	12	3,600
2	Marketing Managers	3	120	5	1,800	12	4,320
3	Supervisors ..	12	80	5	4,800	12	11,520
4	Clerks	2	60	8	960	12	1,440
5	Peon	1	30	8	240	12	360
6	Clerks	3	60	5	900	12	2,160
7	Peons	3	30	5	450	12	1,080
8	*Kamdars* ..	12	40	5	2,400	12	5,760
9	Superintendent, Veterinary.	1	300	8	2,400	12	3,600
10	Veterinary Inspector	1	150	5	750	12	1,800
11	Veterinary Assistant Surgeon.	1	100	5	500	12	1,200
12	Compounders ..	5	50	5	1,250	12	3,000
13	Peon	1	30	8	240	12	360
14	Peons	5	30	5	750	12	1,800
15	Clerk	1	60	8	480	12	720
16	Sweepers ..	1	30	5	150	12	360
17	Water Carrier ..	1	30	5	150	12	360
			Total	..	20,620		43,440
	(7) Feeding of cattle, etc.						
1	Dairy Cattle ..	250	40 per mensem.	5	50,000	12	1,20,000
2	Draught bullocks ..	900	40 per mensem.	5	1,80,000	12	4,32,000
3	Running expenditure on tractors.	60	600 per mensem.	5	1,80,000	12	4,32,000
4	Running expenditure on bull-dozes.	4	1,500 per mensem.	5	30,000	12	72,000
5	Running expenditure on lorries.	50	300 per mensem.	5	75,000	12	1,80,000
			Total	..	5,15,000		12,36,000

Statement of Working Expenses—(concld.)

ial	Particulars	Quantity	Rate	1946-47 Number of months	1946-47 Amount	1947-48 and subsequent years Number of months	1947-48 and subsequent years Amount
		No.	Rs.		Rs.		Rs.
	(8) Contribution to Funds						
	Depreciation on tractors.	60	500 per mensem.	5	1,50,000	12	3,60,000
	Depreciation on bulldozers.	4	1,000 per mensem.	5	20,000	12	48,000
	Depreciation on bullocks.	900	5 per mensem.	5	22,500	12	54,000
	Depreciation on diary cattle.	250	5 per mensem.	5	6,250	12	1,50,000
	Depreciation on lorries.	50	125 per mensem.	5	31,250	12	75,000
	Depreciation on carts	200	4 per mensem.	5	4,000	12	9,600
	Leave and pensions	11 percent of salaries.	..	..	12,179	12	24,271
	Allowances and Honoraria.	1/3rd of salaries.	..	..	36,905	12	73,548
			Total	..	2,83,084		6,59,419
	(9) Labour						
	Party A (250 men)	..	25,000 per mensem.	5	1,25,000	12	3,00,000
	Party B (1,000 men)	..	37,500 per mensem.	5	1,87,500	12	4,50,000
			Total	..	3,12,500		7,50,000
		Recurring Expenses		..	..		2,67,450
			GRAND TOTAL	..	12,21,299		31,33,513
			Say	..	12,21,300		31,33,500

APPENDIX IV

Financial Forecast

Year		Gross Receipt	Working Expenses	Interest at 3 per cent.	Total charges	Profit or loss
		Rs.	Rs.	Rs.	Rs.	Rs.
46-47	..	..	12,21,300	1,00,640	13,21,940	—13,21,940
47-48	..	23,59,000	31,33,600	2,31,270	33,64,770	—10,05,270
48-49	..	36,07,500	31,33,500	2,61,150	33,94,650	+ 2,12,850
				Total	..	—21,14,360

APPENDIX V

Budget Forecast

Year	Capital expenditure	Gross receipts	Working expenses
	Rs.	Rs.	Rs.
1946-47..	67,09,000	..	12,21,300
1947-48..	20,00,000	23,59,500	31,33,500
1948-49..	..	36,07,500	31,33,500

SCHEDULE A

Details of buildings, vide *Item* II *of Appendix I*

Serial number	Item	Cost
		Rs.
1	Director's house	35,000
2	Director's Office	35,000
3	Staff quarters for main office	44,000
4	Agriculture Officer's houses	45,000
5	Agriculture staff quarters	2,72,000
6	Irrigation Assistant Engineer's house	15,000
7	Irrigation staff quarters	36,000
8	Extra Assistant Conservator's house	15,000
9	Forest staff quarters	73,000
10	Health Officer's house	20,000
11	Health staff quarters	1,06,000
12	Animal Husbandry Officer's house	15,000
13	Animal Husbandry staff quarters	1,64,000
14	Seed and Produce godown	1,25,000
15	Sheds for bull-dozers	4,000
16	Tractor sheds	30,000
17	Lorry sheds	50,000
	Total	10,84,000

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APPENDIX IV

Mr. C. M. Bowder's "Report on Naini Tal-Tarai Survey."

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REPORT BY C. M. BOWDER, ESQUIRE, SUPERINTENDENT, AND EXECUTIVE ENGINEER, TARAI AND BHABAR GOVERNMENT ESTATES DIVISION, NAINI TAL ON THE TARAI SURVEY.

Introductory

When "Post-War Planning" began to be thought about in 1942, suggestions in regard to it were invited from the various departments, and Mr. Russell, the then Superintendent of these Estates, submitted as his contribution, on May 20, 1943, his "Soldiers Settlement Scheme". Rampur State collaborated with the Estates in the Scheme, which in broad outline provided for settling ex-servicemen, on a collective farming basis, in an area of 50,000 acres centred round Rudrapur in the Kichha Tahsil of the Naini Tal District, and 30,000 acres based on Bilaspur in Rampur State. The settlers were to be provided with masonry, mosquito-proof houses, cultivation was to be machanized and anti-malarial measures bulked large in the Scheme, which in so far as these Estates were concerned, was estimated to cost Rs. 2·02 crores, initially, but of which Rs. 1·8 crores were to be recoverable in easy instalments, and Rs. 58,500 were, in addition, to be annual recurring charges.

Sir William Stampe, Irrigation Adviser to the Government of India, was asked by His Excellency the Governor of the United Provinces his opinion as to the practicability of the Scheme, and he condemned it on June 20, 1943, on the ground that the tract required heavy drainage before it could be considered fit for the colonization of ex-servicemen, and that from an engineering point of view such drainage was an insuperable problem except at prohibitive cost both in initial outlay and subsequent maintenance.

Nothing daunted the Government again renewed their attack, and in G. O. no. 2885, dated November 11, 1944, ordered that a detailed, topographical, contoured survey of about 159 square miles of the Tarai should be made in order to "ascertain whether by improved drainage a large area in the Tarai can be brought under regular cultivation." The southern and eastern boundaries of the tract to be surveyed were fixed in the Government Order as the Rampur State and the Haldwani-Kichha metalled road, respectively and the Superintendent who had only taken over charge in the previous month was asked to consult his predecessor, Mr. J. W. Russell, and Mr. T. R. Low, then Additional Director of Agriculture (War Production) in regard to the Northern and Western boundaries of the plot. This was done and these boundaries were fixed as the Lalkua-Kashipur railway line and the Baur River, respectively. The requisite staff for the survey were not, however, available until the spring of 1946 and the survey was completed between February and September of that year.

Description of the tract Selected

The total area within the above boundaries is 201·10 square miles or 128,764 acres. Of it, 1,536 acres belong to Rampur State (Suar Tahsil), 24,086 acres are Tarai and Bhabar forest land, 3,255 acres are zemindari, 3,381 acres are long-term lease (maturing in 85 to 96 years from now) kham land, and the balance, viz. 96,446 acres ordinary kham land. No area statistics of the Forest area exist, but from observation at site, it is all culturable, except for the area covered by streams and roads. It may safely be assumed that 75 percent. of it, or 18,100 acres are culturable. Of the ordinary kham land 89,246 acres are culturable, of which only 12,876 acres are cultivated, and 7,200 acres are unculturable. The kham and zamindari area lie partly in the Rudrapur Pargana of the Kichha Tahsil and partly in the Gadarpur Pargana of the Bazour Tahsil, while the Forest area lies not only in the above two parganas, but also partly in the Chakrata Bhabar Pargana of the Haldwani Tahsil.

In the Rudarpur Pargana, there are 57 villages of which 3 are zamindari, 9 long-term lease kham, and 45 ordinary kham. Of these latter 6 are inhabited by Buxas, an indigenous tribe, and the remainder by *desi* cultivators. In the Gadarpur Pargana there is one zamindari village, 23 Buxas villages and 29 *desi* villages.

To the Buxas, the Tarai is either paddy or nothing and they are extremely wasteful of water when irrigating their crops. The spring level of the tract (observed in April-May, 1946) varies from 5′ to 20′ and it is significant that it is at its highest in the Buxa stronghold, viz., the Gadarpur Pargana. It is, therefore, suggested that the Buxas should be re-settled outside the colonization area. They are fond of moving their habitations, there are areas available for them both north of the Lalkua-Kashipur railway line and west of the Baur River. This move would cost about Rs. 50,000 only, in compensation and the erection of new houses, and would be easy to carry out because of (i) the nomadic instincts of the Buxas, and (ii) the fact that the United Provinces Tenancy Act applies to only 17 of the 29 villages occupied by them ; the remainder are not governed by this Act, or by any other, in regard to hereditary tenure. Special legislation would be necessary in regard to the removal of the Buxas from the 17 villages, but it would be a simple matter because of (i).

The tract surveyed contains large fuel and pasture reserve, which are well established, and it is suggested, therefore, that they should be allowed to continue.

If the recommendations made above in regard to (i) the re-settlement of the Buxas, and (ii) fuel and pasture reserves are accepted, the culturable area available for colonization will be as follows :

	Acres
(*a*) Present culturable kham area	89,246
(*b*) To this add the area cultivated by Buxas ..	3,580
(*c*) Also add the Forest area	18,100
Total	110,926

From this sub-tract—

(d) This area cultivated by desi tenants plus 20 percent. more to allow for future expansion —120 perecent. of 9,296 acres	**11,620**
(e) Fuel and pasture reserve	**5,000**
Total	**16,620**
Hence net culturable area available—110,926 minus 16,620	**94,306**

There are some 20,000 *semal* trees and a few *khair* and *shisham* trees in the forest area, but these need not be felled until actually required. Broadly speaking, however, the forest area is characterized by enormous grassy plains, surrounded by narrow belts of trees—mostly *kokat*, with the exceptions noted above—and hence it is not anticipated that the Forest Department will raise any objection to the handing over of the area on the terms suggested. In regard to Mr. Russell's scheme the Chief Conservator of Forests, United Provinces, has stated in his letter no. 189/35—3, dated August 5, 1943, to the Deputy Commissioner, Naini Tal, "with reference to paragraph 3 of the Board's letter, the Secretary may be informed that I do not oppose disforestation, " and then went on to say that he enclosed a memo. showing the attitude of the Forest Department towards this scheme. A copy of the memo. is attached hereto.

The tract lies in the mid and lower Tarai belts roughly half and half. The soil is, generally speaking, a rich loam, with a high humus content, and very fertile. It is admirably suited to the growing of wheat, paddy and sugarcane. Twenty-nine strata charts are appended on section paper as Plan no. 2 (for the Chief Engineer only due to the shortage of tracing cloth and ferro paper). The annual rainfall is 50″, of which 10″ falls between October and May and the balance; between June and September. The natural slope of the country varies from 40 to 50 feet a mile in the north-south direction and from 15 to 1·5 feet a mile in the east-west direction. Both longitudinal and lateral slopes are therefore excellent. The tract is well served by natural drainage lines, the main one being the Bhakra River, and there are a host of others, *vide* the Index map, Plan no. 1. The potential natural drainage of the country is, therefore, excellent, but is hampered by the following :

(i) The drainage lines are never cleared and are, therefore, a mass of tall grasses, fallen trees, weeds, etc. which restrict the flow of the water very appreciably.

(ii) Several of the drainage lines are used for irrigation purposes throughout the year, and the dams and bunds built across them do not permit the areas above these obstructions to drain down as nature intended them to.

(iii) Owing to the paucity of cultivation in the area, the bulk of it is covered by high stubby-rooted grass, and patches of forest which check the flow of rain water.

Despite these brawbacks, there is, due to the good country slopes and numerous drainage lines, surface pooling whatever, other than in the three small areas shown on the Index map, and of these the one about a mile south of Lalkua is inherent in the tract—the dividing line between the Bhabar and the Tarai is just above it and water trapped in the Bhabar thus reveals itself on entering the comparatively flatter, and more compact, Tarai. This phenomenon is not noticeable in other parts of the tract selected because the boundary between the Bhabar and the Tarai slopes up sharply in a north-westerly direction from Lalkua and hence the spring belt is north of the railway line, to the west of Lalkua. The total swampy area is only 2·28 square miles, which is insignificant, and which could be reclaimed at small cost by clearing and deepening the drainage lines through it.

The objection raised by Sir William Stampe in regard to the faulty drainage of the Tarai do not apply to this particular portion of it. His main point was that the major hill fed rivers come down in heavy spate and that on entering the comparatively flatter Tarai they overflowed their banks, and in doing so obstructed the lateral drainage of the tract. But it is only with the least of these hill streams that this particular area is concerned, viz. the Bhakra, and by the time it enters the area it is a deep-set Tarai river which rarely over-flows its banks.

It is high time, however, that a further rise in the water table—particularly in the Dhimri-Bhakra doab, should not only be arrested, but made to fall, and proposals in this connexion are detailed in the concluding paragraph of this report.

The survey

One Assistant Engineer and three Overseers of the Irrigation Department were deputed in February, 1946, to this survey, which was carried out under the gerenal direction of the Executive Engineer of the Tarai and Bhabar Government Estates Division, Naini Tal. In addition to this staff, one Overseer one ziladar and one amin, from within the Tarai and Bhabar Government Estates Division were employed on the survey as otherwise it would have been impossible to finish the field work in the short time available—February-June, 1946. The results of the field work then took from July-September to plot and compile, and the survey party was disbanded on September 30, 1946.

The best maps of India are those produced by the Survey of India Department, and hence it was desirable to correlate this detailed survey to the Survey of India maps of the area. This was done by linking all ground levels to the Survey of India Bench marks (known as G. T. S. Bench marks) in the vicinity : there were two such, viz. those in the yards of the Kichha and Lalkua railway stations. Intermediate bench marks were then established, by double levelling, with reference to these initial bench marks, at ½ mile intervals, on (i) the Lalkua-Kashipur Railway Line, (ii) the Kichha-Rudrapur-Kashipur road, (iii) an intermediate, base line running from east to west 3 miles south of Lalkua and (iv) an intermediate base line running from north to south 6 miles west of Lalkua. The entire area was then levelled with reference to these main and intermediate bench marks on lines ½ a mile apart, *vide* the Index map, Plan no. 1 ground levels on each of these lines were recorded at 330 feet intervals. A net work of levels was thus produced and from them very accurate contours were possible. These latter have been shown on the large scale 16½=1 mile *shajra* maps, which are not included here as they have been shown to the Chief Engineer, Eastern Canals, and as only one copy of them is available. The contours have been marked at 5.0′ intervals where the country slope is severe and at 1.0′ intervals in the flatter portions. Spring levels were observed of (1) all drainage lines crossed by the survey lines (at the point of crossing), (ii) all wells in the vicinity of the survey lines, (iii) several trial pits between the drainage lines. The results of these observations have been plotted. on the 5 cross section lines shown on Plan no. 3. Cross sections nos. 1—3 on this plan are of the Kichha-Kosi doab, while cross sections nos 4 and 5 are of the southern portion of the area proposed for colonization. Spring and ground levels have been shown on these cross sections which give a very vivid picture of the country traversed. The spring level varies, generally, from 5′ to 20′ below ground level. In a few places it comes near to, or above, ground level, but this is ascribable either to the great distance between the points of observations, or to local heading up due to bunds or regulars. (Plan no. 3 has been sent to the Chief Engineer only due to the great shortage of ferro paper).

The bed and high flood water surface slopes of the main rivers traversing the area in the reach between the Lalkua-Kashipur railway line on the north, and the Bareilly-Moradabad railway line on the south, and also the spring level slopes per mile of these rivers in the length intercepted between the various cross section lines have been shown in Appendices I and II respectively and need no special comment other than that the slopes are, in all cases, good.

In addition to the ground work detailed above an air photograph of the area was taken by Indian Air Survey and Transport Limited, Dum Dum, in February, 1946. This was not an ideal month in which to take it, as much of the long Tarai grass as then at its highest is apt to obscure detail. April was recommended, but the firm was unable to arrange a plane then. Nevertheless, the photos have shown the cultivated areas very clearly, and the tracing which has been made from them can be contoured and used for the working out of a general plan of action for the colonization scheme. These photos are on a scale of 4.03 inches to 1 mile (approximately), and a tracing of them is appended as Plan no. 4 (here again due to the shortage of ferro paper, only the Chief Engineer has been supplied with a blue print).

The survey of the area was a particularly arduous task due to (i) the difficulty in keeping the labourers contended and happy in such an isolated and wild-animal ridden area, (ii) the difficulty in procuring food supplies due to the various controls, (iii) the shortage of labour once the hillmen returned to their homes in March, (iv) the untimely rain in April and May, (v) malaria and (vi) levelling instruments which had no stadia wires (none with stadia wires were procurable) :this involved an excessive amount of jungle clearance and chaining.

The survey party therefore deserve great credit for the successful completion of their task in the face of such heavy odds.

The field work cost Rs. 22,250 and the air photographs Rs. 9,251, total Rs. 31,501 or Rs. 157 per square mile which is reasonable.

The Proposed C. L. Railway

The proposed alignment of this railway has been shown on the Index map. Quite apart from the fact, that it will cut across the eastern fringe of the area and therefore be of material use to the few instead of to the many, the railway embankment is not aligned along a main watershed and is bound, therefore, to intercept the drainage of the country to some extent, even though it may be well provided with cross drainage works, because these latter do not always function as well as they might owing to partial silting up during the monsoon, insufficient waterway, etc.

It is suggested that the Railway authorities be asked to see whether they could alter the alignment to the area adjoining the Lalkua-Tanda road. This road is on a main watershed for the major portion of its length, and the drainage problem would, therefore, be much simpler. Further, from the colonization point of view, it would serve the area far better. A station could be opened at Tanda Chauki, 5½ mile west of Lalkua, where serveral trains now halt for the convenience, of railway gangmen, while the main junction could be left at Lalkua as at present proposed.

Conclusions and Recommendations

The survey has served a most useful purpose : it is possible now to locate villages, roads, tube-wells, farms, etc. with precision. The survey also reveals that no costly drainage scheme is a pre-requisite to the colonization of the tract, but that the colonization of the area, as detailed by Mr. F. H. Hutchinson, Chief Engineer, in his note no. C-357/C. E. E., dated April 4, 1946, could be started, immediately if the following measures are taken in hand concurrently with the scheme :

(i) The annual clearance of all the drainage lines which get heavily choked with grass, trees, etc. during the monsoon, is necessary. There are 200 miles of main channel and 100 miles of subsidiary channel. This would cost Rs. 60 per mile for the main lines, and Rs. 30 per mile for the subsidiary ones, or a total annual recurring charge of Rs. 15,000.

(*ii*) Straightening of a few sharp bends in the main drainage lines, lump sum Rs. 5,000 recurring.

(*iii*) Rabi irrigation is unnecessary in this tract in normal years and should be forbidden except in a drought year. In normal years, as soon as the monsoon is over, all regulators on these streams should be opened up fully, all canal heads closed and all bunds removed. These measures would help the country to drain down in 8 out of every 12 months of every normal year and would be a very potent factor in lowering the water table. Ultimately, as envisaged in Mr. Hutchinson's asheme, all canal irrigation should be replaced by tube-wells and all canal regulators and bunds should then be done away with. Some of the canals are at present aligned off the watershed, while others have excessive command and breach easily by reason of the innumerable cattle which cross them; both defects are contributory causes to the high water table, but as it is recommended that canals should be abolished completely, it is not worthwhile remedying these defects. These tube-wells will also play an important part in lowering the water table.

(*iv*) The Buxas must be removed from this area and transferred to areas which are available for them elsewhere. Only 29 villages having a total cultivated area of 3,580 acres are involved, but their removal is, for the reasons already explained under "Description of the tract selected", absolutely essential to the success of the scheme. The removal of these villages would cost Rs. 50,000, non-recurring.

(*v*) Late varieties of rice should be replaced by early varieties, which require less water.

(*vi*) Drains six feet deep should be dug through the swampy areas.

(*vii*) Anti-malarial measures should be taken up in a really up-to-date way. An Army expert, who has had experience of this work during the late war in the Arakan and Assam, should be called in to advise and to have the work done by his own staff under his guidance.

(*viii*) All main water courses from the proposed tube-wells should be given an impervious lining.

Items (vi) and (vii) have already been allowed for in Mr. Hutchinson's proposals, while item (v) requires no expenditure. Item (viii) will have to be provided for when the estimate referred to in paragraph 16 of Mr. Hutchinson's scheme is prepared . The forbidding of *rabi* irrigation referred to in item no. (iii) will cost no money and the tube-well portion of it will be included in Mr. Hutchinson's proposed irrigation project. Items (i), (ii) and (iv) involve an expenditure of Rs. 20,000 recurring and Rs. 50,000 non-recurring, and are strongly recommended.

APPENDIX No. I

Statement showing difference in levels of bed and high flood marks of rivers between crossings with Lalkua-Kashipur and Bareilly-Moradabad Railway Lines

Sl. no.	Name of river or Nadi	Crossing with Lalkua-Kashipur Railwayline, O. & T. Railway	Rt. of bed	H. F. marks	Crossing with Bareilly-Moradabad Railwayline E. I. R.	Rt. of bed	H. F. marks	Difference in		Approximate, length in miles along stream	Slope per mile of	
								Bed levels	H. F. marks levels		Bed	H. F.'s marks
1	Kehha River	Cross line no. 7, north at 3—4 of Base line north-south about 1 mile east of Lalkua Railway Station with subsidiary.	813.77	823.90	With Bareilly-Moradabad Railwayline E. I. R.	543.26	561.96	270.51	261.94	92	2.94	2.85
2	Bahagul River	Base line east-west from 26—2 of Bareilly-Naini Tal Road.	718.01	728.01	Ditto ..	543.26	561.96	174.75	166.05	49	3.57	3.39
3	Bhakara River	Lalkua-Kashipur Ry. line O. & T. Railway.	745.46	764.50	Ditto ..	542.00	563.9	203.46	200.60	67	3.04	2.99
4	Baur River	Ditto ..	722.36	734.50	Ditto ..	542.00	563.60	180.36	170.60	111	1.62	1.54
5	Kosi River ..	Ditto ..	722.10	736.70	Dtto	603.30	618.25	118.80	118.45	64	1.86	1.85

APPENDIX NO. II

Statement showing slopes of spring levels of rivers in various reaches

		A	B	C	D	Reach A-B			Reach B-C			Reach C-D		
Sl. no.	Name of river or Nadi	S. L. at Lalkua-Kashipur O. T. R. crossing	S. L. at cross line, no. 1 crossing	S. L. at cross line, no. 2 crossing	S. L. at cross line, no. 3 crossing	Difference of S. L. in feet	Length of river in miles	Slope of S. L. in feet	Difference of S. L. in feet	Length of river in miles	Slope of S. L. in feet/mile	Difference of S. L. in feet	Length of river in miles	Slope S. L. in feet/mile
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Kichha Nadi	..	811.77	747.91	685.71	..	..	..	63.86	5.43	11.76	62.20	7.5	8.30
2	Bahagul Nadi	Dry	749.84	725.39	679.34	..	..	..	73.45	6.57	11.18	46.05	10.4	4.43
3	Bhakara Nadi	748.46	713.08	675.70	646.85	35.38	6.25	5.66	37.38	10.5	3.56	28.85	11.25	2.56
4	Baur Nadi	723.86	675.48	656.15	641.53	48.38	9.75	4.96	21.33	8.82	2.41	12.62	8.82	1.43
5	Kosi Nadi	724.10	685.07	668.32	653.24	39.03	10.68	3.66	16.75	6.57	2.55	15.08	7.5	2.01

APPENDIX III

PROPOSED COLONIZATION SCHEME IN NAINI TAL TARAI

REFERENCE—*Sir William Stampe's Memo. No. I.C.* 70, *dated July* 4, 1943, *paragraph* 8

1. The following is a more detailed and more accurate account of the attitude of the Forest Department.

2. The Chief Conservator of Forests informed the second conference that he had convened a meeting of forest officers with an intimate knowledge of conditions in the Tarai and Bhabar to discuss the scheme and their unanimons opinion was as follows :

3. *Proposed site north of the Main Tarai Road*—We consider this area so unhealthy that, in our opinion, it is inadvisable to consider it as a site for a colony of ex-soldiers.

We are not prepared to express an opinion on the purely technical engineering aspect of the drainage problem but from our knowledge of monsoon conditions in the Tarai and Bhabar tracts, we consider that any drainage works would be very costly and difficult. The geological and climatic factors which are the primary cause of unhealthy conditions in this tract are unalterable and would entail an unceasing fight against nature. Drainage works would require heavy annual recurring expenditure to maintnin. Whilst such works and other remedial measures would alleviate the unhealthy conditions, we ourselves have no faith that they would be adequate.

In this regard it is important to keep in mind the probable attitude of the Kumaoni and Garhwali who form the greatest proportion of the fighting services in the United Provinces. They hate and fear the Tarai during the hot weather and the rains. We think it would be difficult to persuade them that the remedial measures proposed would make this area habitable as a permanent settlement. If they accepted land in this area, we believe they would become absentee landlords.

4. *Disforestation in the area*—The forest in this area is open and generally of poor value. In view of the importance of the scheme, the Forest Department would not oppose disforestation of the area to be brought under cultivation. It must he remembered, however, that the rights and concessions in the Tarai and Bhabar forests are heavy and the incidence of grazing particularly heavy. The scheme would increase the burden of all existing concessions whilst reducing the available forest area to support them.

5. *Afforestation*—One proposal is that there should be a protective belt of forest north of the cultivated area as protections against mosquitoes. We know of no publication which proves that tree forest is a protection against mosquitoes and our practical experience indicates that forest does not give such protection.

Mr. Russell suggested that this forest belt should consist of eucalyptus and chir pine. Both species are exotics in this area and their natural habitation is on well drained, light sandy soil the opposite soil conditions to those prevailing in the Tarai. *Chir* pine (a hill species) would be out of the question and no forest officer would recommen eucalyptus in such a tract.

We have had experience of trying to raise plantations in the Tarai and they have proved to be failure or partial failures. They could not be made economic—the initial cost and subseqeunt tending would rule this out but I have no doubt we could obtain partial success on selected sites with indigenous species if cost was not a consideration.

W. T. HALL,
Chief Conservator of Forests,
United Provinces.

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APPENDIX V

GOVERNMENT OF THE UNITED PROVINCES

No. 222-C/XII-C—26-1946

RURAL DEVELOPMENT (COLONIZATION) DEPARTMENT

Dated Lucknow, October 11, 1946.

OFFICE MEMORANDUM

The Governor has been pleased to constitute the following committee to investigate the various problems both from the technical as well as from the administrative point of view and to prepare a blue-print of schemes for the all-round development of the Tarai areas in Naini Tal Tarai and Bhabar Estates, North Kashipur Sub-Division, district Naini Tal, Afzalgarh Pargana in district Bijnor and Lakhimpur-Kheri :

Hon'ble Premier .. .. .. *Chairman.*

1. Hon'ble Minister of Justice .. .. *Vice-Chairman.*
2. Mr. F. H. Hutchinson, Chief Engineer, Eastern Canals .. ..
3. Director of Public Health, United Provinces or his nominee .. ..
4. Director of Agriculture, United Provinces, or his nominee .. ..
5. Director of Animal Husbandry, United Provinces, or his nominee .. .. ..
6. Registrar of Co-operaive Societies, United Provinces or his nominee .. .. ..
7. Chief Conservator of Forests, United Provinces ..
8. Mr. J. W. Russell, Superintending Engineer, T-W, Western Circle .. .. ..
9. Director of Resettlement and Employment, United Provinces .. ..
10. Chief Engineer, Development .. ..
11. Deputy Commissioner, Incharge Kumaun Division
12. Superintendent, Tarai and Bhabar Estates ..
13. Lieut.-Col. Kelly, Superintendent, Central Prison, Bareilly .. .. } *Members.*
14. Revenue Secretary or his nominee .. ..
15. Finance Secretary or his nominee .. ..
16. Secretary, Agriculture or Deputy Secretary ..
17. Lieut.-Col. Corbett .. .. ..
18. Pandit Ganga Dutt Mashiyal .. ..
19. Pandit Lakshman Dutt Bhatt .. ..
20. Khan Bahadur Sarwat Yar Khan .. ..
21. Pandit Chintamani Pant .. ..
22. Mr. R. N. Agarwal (Kichha Farm) .. ..
23. Dr. C. D. Pande, Private Secretary to H. P.
24. Shri Shyam Lal Varma, M.L.A. .. ..
25. Mr. Sayed Ahmad, M.L.A. .. ..
26. Rani Saheba Phul Kunwari, M.B.E., M.L.C., Naini Tal .. ..
27. Mr. G. S. Chooramani, R. T. O., Kumaun Division, Naini Tal .. ..
28. Rai Bahadur Radha Kant, Officer on Special Duty, Agriculture Department .. *Member-Secretary.*

2. The terms of reference to the committee are to examine the various schemes for the development and colonization of Tarai, North Kashipur (district Naini Tal) and Afzalgarh in the district of Bijnor, with special reference to the points mentioned below and to prepare a blueprint of the schemes for the development of the Naini Tal Tarai, North Kashipur, North Afzalgarh, district Bijnor and Lakhimpur-Kheri, for settlement by ex-servicemen :

(1) Measures necessary to eradicate malaria.

(2) The best means of irrigation in these areas consistent with the control of malaria and in particular the possibility of tube-well irrigation.

(3) The communications and roads which are necessary to open up these tracts.

(4) The best method of farming, whether it should be on the lines of co-operative farming or state farms.

(5) The disposal of and the terms on which the land should be given to settlers.

(6) The acquisition of the land in North Kashipur, and North Afzalgarh and Lakhimpur-Kheri from the zamindars, and/or their lessees.

3. The Government is further pleased under rule 20(*b*) of the Travelling Allowance Rules (Financial Handbook, Volume III), to decide that the non-official members of the committee will, subject to the provisions of note (2) below that rule, draw travelling allowance or daily allowance at the rate admissible to officers of the first class. Travelling allowance will be admissible only from and to the usual place of residence of the non-official members and where concession fares for return journeys are allowed by the railway, travelling allowance will be limited to the actual cost of the return ticket plus one-half of the ordinary first class fare each way. He has also appointed the Officer on Special Duty (Agriculture), Rai Bahadur Radha Kant as the authority competent to countersign the travelling allowance bills of such members.

4. The charge on account of travelling allowance of non-official members will be debitable to the head "63—Extraordinary charges—P—Schemes for resettlement of ex-soldiers and labour (*a*) Officer on Special Duty in the Agriculture Department—Allowances and Honoraria", while the pay of the stenographers will be debitable to the sub-head "Pay of Establishment" under the same head. Pay of the official members should be debited to the departmental budget to which their pay proper is debited.

5. The report of the committee is to be submitted to Government as soon as possible.

V. C. SHARMA,
Deputy Secretary.

No. 222(*c*)(*i*)/XII-C—26-1946

COPY forwarded to Rai Bahadur Radha Kant, Officer on Special Duty (Agriculture), United Provinces Civil Secretariat, Lucknow, for information.

V. C. SHARMA,
Deputy Secretary.

No. 222(*c*)(*ii*)/XIIC—26-1946

FINANCE DEPARTMENT

COPY forwarded to the Accountant General, United Provinces, for information.

By order,
K. S. GOYAL,
Additional Assistant Secretary.

GOVERNMENT OF THE UNITED PROVINCES

No. 259-C/XIIC—26-1946

RURAL DEVELOPMENT (COLONIZATION) DEPARTMENT

Dated, Lucknow, October 16, 1946

OFFICE MEMORANDUM

THE Governor has been pleased to nominate Brigadier J. A. Wilkinson of the Resettlement Department on the Tarai and Bhabar Development Committee constituted in Office Memorandun no. 222(*c*)/XIIC—26-1946, dated October 11, 1946.

V. C. SHARMA,
Deputy Secretary.

GOVERNMENT OF THE UNITED PROVINCES

No. 271-C(ii)/XIIC—26-1946

RURAL DEVELOPMENT (COLONIZATION) DEPARTMENT

Dated Lucknow, December 2, 1946

OFFICE MEMORANDUM

THE Governor has been pleased to nominate Shri Hira Lal Arya of Naini Tal on the Tarai and Bhabar Development Committee constituted in Office Memorandum no. 222(c)/XIIC—26-1946, dated October 11, 1946.

V. C. SHARMA,
Deputy Secretary.

GOVERNMENT OF THE UNITED PROVINCES

No. 335 C/XIIC—70-1946

RURAL DEVELOPMENT (COLONIZATION) DEPARTMENT

Dated Lucknow, February ? 1947.

OFFICE MEMORANDUM

THE Governor has been pleased to nominate Pandit B. D. Pande, M.L.C., on the Tarai and Bhabar Development Committee constituted in Office Memorandum no. 222(c)/XIIC—26-1946, dated October 11, 1946.

V. C. SHARMA,
Deputy Secretary.

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APPENDIX VI

QUESTIONNAIRE

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APPENDIX VI

QUESTIONNAIRE

(For the use of the Tarai and Bhabar Development Committee and its Sub-Committees)

Measures necessary for the control of malaria

1. With the recent developments in Science which has placed powerful insecticides and drugs within the reach of the malariologist to fight malaria and persistent effort in that direction, it is possible to keep malaria under control so as to create conditions for a normally healthy living in the Tarai ?

2. What are the pre-disposing causes of the unhealthiness of the tract, with particular emphasis on the factors contributing to the prevalence of malaria ?

3. What measures, prophylactic as well as curative, may be adopted to reduce the incidence of malaria and to make the tract reasonably healthy for the settlers as also to avoid creating conditions favourable to the spread of malaria ?

4. What engineering works in the form of better alignment of canals (including closures, if absolutely essential) improvement or construction of drainage channels, masonry embankments of streams at sites of fords or breaches are required to prevent water-logging and facilitate proper drainage ?

5. In order to achieve the above purposes, is it necessary to have a detailed survey to make a contoured map and to obtain levels, mark out offending water-courses and to locate tube-wells, should they be practicable?

6. Whether the thick forests and tall grasses exercise a pernicious effect on the climate and encourage breeding of mosquitoes ? What steps should be taken to keep the non-cultivated area inside or on the borders of the colony permanently free of trees and tall grasses ?

7. What precautions should be undertaken in selecting village sites and in building residential houses ? Whether any restrictions should be exercised on the method of cultivation near village sites ?

8. What measures should be adopted to ensure supply of healthy, unpolluted water for human consumption ?

9. Does canal irrigation aggravate moistness and sickness in a tract with high water table, by continuously over-laying the surface with water? Will tube-well irrigation provide a proper and practicable substitute?

10. (*a*) What organisation—permanent or temporary—will be required for bringing malaria under control and for incessantly conducting the anti-mosquito and anti-larval operations ?

(*b*) Whether it will be necessary to have a separate anti-malaria officer and organisation for the Tarai ?

11. What equipments, medicines and drugs will be required for anti-malarial operations ?

12. What immediate steps must be undertaken for the training of the personnel in anti-malaria measures and for controlling malaria as reclamation proceeds ? A plan of campaign for the drive against malaria in the coming cold weather may be suggested.

System of Irrigation suited for the Tarai Area

13. Is it advisable to limit canal irrigation and to restrict irrigation to tube-wells as far as possible ?

14. Will the tube-wells be practicable in the Tarai ? If a survey of possibilities is required, what steps should be taken immediately to achieve the end? Will tube-well irrigation be an economic proposition both from the State's point of view and that of the cultivator ?

15. In the absence of hydro-electric, what source of power is suggested for working the tube-wells? Will the diesel oil engines or tractor engines fitted with a power take-off be able to hold their own, looked at from the commercial point of view ?

16. Having regard to the immense potentialities of the Tarai from the Grow-More-Food standpoint, is it advisable to judge the capital outlay on the irrigation projects from purely the 'productive' standpoint ?

Means of Communications

17. In the interest of the proper development of the tract, is it necessary to metal the existing roads from (1) Rudrapur to Gadarpur, (2) Gadarpur to Bazpur, (3) Rudrapur to Haldwani or Rudrapur to Lalkuan *via* Tanda, (4) Gadarpur to Haldwani or Gadarpur to Lalkua *via* Gularbhoj and Tanda, (5) Kashipur to Jaspur, (6) Lalpur to Pipalsana, and (7) Afzalgarh to Kalagarh, or any portions thereof ?

18. Is it desirable to alter the alignment of the proposed railway straight from Rudrapur to Lalkua to be re-aligned along the water sheds from Rudrapur to Tanda ?

System of Farming

19. What system of farming should be adopted—individual, co-operative or collective or State Farming ?

20. Should the area be developed with the ultimate object of converting it into a State farm or should the area be developed by the State and made over to settlers for co-operative or collective farming ? If the State farm is preferred, what organisation is suggested for its efficient management ?

21. In view of the scarcity of labour, is it desirable to have mechanical cultivation in the area ? What other labour-saving devices may be adopted ?

22. What is the most economical and practical type of fence that can be adopted to keep off the wild animals.

23. What agricultural staff will be required in the initial stages of development for clearance of scrub jungles, levelling and laying out farms ?

24. What agricultural machinery, implements and other equipments, seeds and manure will be required for farm operations ? Estimates may be given ?

25. What immediate steps must be undertaken to start agricultural operations in the coming cold weather, if at all possible ?

26. Assuming that co-operative farming would be the system adopted, what should constitute the management of the co-operative farm, what equipment should be allocated to the management and what arrangements should be made for the marketing of produce ?

27. To decide on the unit of land per member of the society.

28. Assuming that the co-operative system of farming is to be recommended, are we to advocate the introduction of mixed farming all over the area ?

29. The type of cattle which are to be maintained under the mixed farming system ?

30. The possibilities of introducing dairy farming and poultry on a commercial basis ?

31. To decide on the most feasible rotation of crops.

32. What proportion of the area should be reserved for pasture and fuel plantations in relation to the area cultivated ?

33. Possibilities of developing fisheries so as to provide more protein food for the population.

Forest and Erosion

34. Consideration of existing relationship of (1) area under cultivation, and (2) area under forest in the United Provinces.

35. Relation of the scheme to the Grow-More-Food Campaign.

36. Necessity of demarcation of those parts of the areas covered by the scheme which can be brought under cultivation and those which should be reserved for forest.

37. Effect of disforestation in these tracts on drainage control and erosion.

38. How far contouring, terracing and strip cropping would be effective to control erosion ?

39. Effect of disforestation on existing rights of cultivators to timber, grass and grazing.

Disposal of Lands

40. Should the Crown lands and those acquired from zamindars be sold to settlers in full proprietary rights ? If so, should it be an outright sale or on an instalment basis extending over a number of years, title to land being perfected at the end of the term ?

41. (*a*) If sale is not preferred, will it be advisable to make a lease of proprietary rights in favour of Settlers Land Settlement Co-operative Society which may let out land to settlers as hereditary tenants ?

(*b*) In the alternative, is it desirable to admit settlers as hereditary tenants under the Crown Grants Act ; the settlers subsequently forming themselves into a Land Settlement Co-operative Society ?

42. In making these grants or letting out lands, is it advisable to lay down restrictions providing—

(*a*) for succession according to rule of primogeniture ;

(*b*) for the impartibility of the holding ; and

(*c*) against sale or transfer of rights to anyone other than a member of the society ?

Acquisition of Proprietary Rights

43. Is it necessary to acquire land from zamindars, or their lessees in Kashipur, North Afzalgarh and parts of Lakhimpur Tahsil in the interest of the development of the area ?

44. As an alternative, will it serve the purpose if a lease of proprietary rights is obtained in favour of the Land Settlement Co-operative Society of the settlers ? If so, whether it should be a permanent lease or for a term ?

45. What terms and conditions should be incorporated in the lease ?

46. How should the annual lease money payable to the proprietor be determined ?

Miscellaneous

47. Consideration of the question as to whether a separate Development Committee is necessary in the interest of the proper development of the tract. If so, its constitution on the (*a*) administrative side—to guide the policy, and (*b*) executive side—to carry out the actual work. What organisation is suggested for (*a*) and (*b*) ?

48. Consideration of the possibilities of starting cottage and large industries in the area, and whether they should be run as State Industries or as Co-operative Home Industries of settlers under official guidance or whether the State should finance a private concern floated for the purpose.

49. Is it necessary to establish a Planning and Construction division for the Tarai ? If so, what organisation is suggested ?

50. Whether any special allowance is necessary for the office and staff working in the Tarai ?

51. What should be the fair size of a village with due regard to agricultural operations and malaria control ?

52. Whether the absence of contour survey in Kashipur and Afzalgarh should hold up actual settlement operations ?

53. What should be the exact boundaries of the areas to be developed and colonised in the Naini Tal Tarai, Kashipur, Afzalgarh and Lakhimpur-Kheri ?

APPENDIX VII

Memorandum by Sir William Stampe, C.I.E., Irrigation Adviser to the Government of India, New Delhi, on the Drainage Problem of the Tarai.

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APPENDIX VII

Memorandum by Sir William Stampe, C.I.E., Irrigation Adviser to the Government of India, New Delhi, on the Drainage Problem of the Tarai.

Dated Rampur, June 20, 1943

1. Introductory

During a visit to His Excellency the Governor in Naini Tal, to discuss certain irrigation matters my opinion was asked as to the practicability, from an engineering point of view, of draining a tract of the local " Tarai " mainly with a view to colonizing ex-soldiers after the war.

Memorandum of two discussions, firstly with His Excellency, Governor's Secretary, Adviser to Governor, Revenue, Executive Engineer, Tarai and Bhabar, Dr. Banerji and Rampur officials including the Chief Minister, at Rudrapur on June 8, and later with Adviser to Governor, Revenue, Executive Engineer, Chief Conservator of Forests and his staff on June 17, 1943, have been recorded as an appendix to this note which summarizes my general conclusions.

2. Historical

The fact that I had been Executive Engineer, Tarai and Bhabar Estates from 1910 to 1916, and had since visited the Tarai on various occasions for discussions with the district staff presumably induced His Excellency to consult me in the matter.

I would record at the outset that, although the criticisms below may appear to be destructive rather than constructive, I am not by nature a destructive critic, as far as engineering problems are concerned. In 1910—17, for instance, I had to carry out Sir John Hewitt's improvement programme on the main Tarai road by which twelve of the larger rivers were bridged by light reinforced concrete large span* structures of a (then) new type. The foundations being mainly in slush were difficult. Yet all these bridges were satisfactorily completed within the estimated cost and are still standing. Various canal reconstruction works were also carried out during this period. I mention these points merely as evidence that difficult local problems *were* successfully tackled. The question of Tarai drainage on a large scale, which involves longitudinal as against transverse treatment of the same rivers is, however, quite a different matter.

The notes below, read in conjunction with the appendix will show that I consider from an engineering point of view, the latter problem to be insuperable except at prohibitive cost both in initial outlay and subsequent maintenance.

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*The East Baigul and Kailas rivers were crossed by 200′ span R. C. arches carried on deep wells. The Baur by a 120′ span and the Bazpur ravine by a 150′ arch. At Kathgodam a 317′ span arch was built.

This opinion is not expressed merely as an *a priori* view. Whilst it is a civil engineer's job to engage and tame nature in the interest of mankind, regard must be had at the same time to the cost of the treatment proposed.

As will be seen all minor attempts made during my tenure of the Tarai to defeat local drainage problems at the request of the then malarial staff (notably Lieut.-Colonel Dunn, I.M.S., D.P.H., United Provinces, Major Graham, I.M.S., Malarial Officer, Government of India) and others, resulted in failure and the tracts that we treated, small as they were, have long since reverted to type. I cannot help contrasting this with the successful reclamation of a swamp in Palestine during the last war when a large area of marshy ground north of Jaffa was successfully drained by my unit—No. 4 Company K. G. O. Bengal Sappers and Miners—using methods which would have been applicable to the Tarai, had similar rainfall and topographical features prevailed. But unfortunately for this scheme they do not.

3. Nature of the Problem

After discussion at length with the officers concerned, I appreciate the problem as follows :

A tract roughly 12 miles long, east and west (i.e. abetween the Kichha-Lalkua road and the Dimri Nadi) and averaging 4 miles in depth, extending say 1½ miles below and 2½ miles above the Rudarpur-Kichha section of the main Tarai road, i.e. approximately 45 square miles or 30,000 acres, is to be (*a*) drained, (*b*) cleared of jungle and grass, and (*c*) adapted for human habitation, with a view to colonizing soldiers from various parts of the Province. To tackle the grass problem it is proposed, I understand, to utilize tractors on a large scale from demobilized mechanical corps of the Indian Army. There is, I believe, nothing intrinsically difficult in this operation. The scheme is to be completed in two or three years and the drainage and road constructions which would presumably be carried out simultaneously by demobilized army units, e.g. Sapper companies. Farms, buildings, etc. would be laid out meanwhile and the country thus prepared for habitation within, say, a three years' period. The malarial problem would be tackled simultaneously by various intensive methods devised on the basis of research and experiment to be carried out during the intermediate period. Colonization at the rate of some specified area per man would be effected rapidly. I gather, in order to prevent the reversion of the treated tracts to nature *during* the development period. Otherwise, it would certainly be difficult to secure the health of a small part of the tract whilst the remainder is still untreated. In fact this danger of " re-infection " of a " reclaimed " area located in the middle of a vast Tarai area still " unreclaimed " is to my mind one of the gravest difficulties threatening the success of this scheme.

An enterprise of this sort would obviously entail the preparation in advance of a highly scientific programme, otherwise it would be defeated in detail by nature during the process. It should be pointed out that simultaneously with the United Provinces development, the Rampur State would be carrying out a similar project in the tract to the south. A metalled road has already been constructed from Bilaspur to Rudarpur in the State and from Rudarpur to Kichha in the United Provinces. Such a sumultaneous effort would admittedly tend to reduce to some extent the physical difficulties encountered by both parties, especially the southern party.

4. Natural Drainage Difficulties

In considering the drainage of a tract of this type the principal factors to be examined are as follows :

(*a*) *Rainfall*—Rainfall must be regarded from two aspects—

(i) the precipitation and " run-off " on the tract concerned,

(ii) the preciptation on and " run-off " from the zones above, which of course affects the passage of water through the tract itself, *vide* pragraph 6 below.

(i) Rainfall records have been examined.

(*a*) The mean annual rainfall at Rudarpur near the west boundary is 45″, of which 10″ falls in October—May, and 35″ in June—September.

(*b*) At Kichha in the east the mean rainfall is 50″ (10″—40″).

(ii) (*a*) At Haldwani 20 miles north of Kichha, the figures are............and..............................

(*b*) At Kaladhungi 20 miles or so north of Rudarpur.......... inches (″and ″).

Thus we can take the mean annual rainfall on the tract as, say, 50″ and on the " Bhabar " zone immediately above it as 60″.

A further zone (i.e. the foot hills to the north of the Bhabar) must also be considered as it is drained by the larger streams which pass through or near the Tarai tract in question, i.e. the Gaula River to the east (the " Kichha " in the Tarai) and the Bhakra River to the west.

The rainfall in this outer hill zone is 80″—100″ and the run-off extremely heavy owing to steep slopes and light afforestation.

(*b*) *Run-off*—The " run-off ", or rate at which the surface water leaves the ground for the rivers depends on (i) the porosity of the local soil, (ii) the amount of grass undergrowth and/or trees, (iii) the slope of the tract both longitudinally (N. & S.) and laterally, towards the intervening river beds.

As stated above, the " run-off " in the hill zone is very rapid resulting after intense rain storms in the Kathgodam-Naini Tal area, in heavy spates down the main rivers. These tend to check the lateral drainage. The Bhabar (or Haldwani-Lalkua) zone immediately above the Tarai has a spongy porous soil and, to the north, heavy tree growth in patches tending to check run-off and reduce the flood intensity in the intermediate streams. In heavy rain, however, especially at the end of the monsoon when the surface is wet, the flood intensity increases and causes erosion of the banks, *see* paragraph 6(*a*) below.

Tarai features—The run-off in the Tarai is checked by the high grass and its stubbly roots, also by the patches of forests. The result is that in spite of heavy longitudinal slopes and fair cross slopes, the country drains badly and widespread surface pooling is set up lasting far into the cold weather, one cause of the mosquito trouble. Further due to the hydraulic phenomena dealt with below (paragraph 6) the streams are not in regime and a highly unstable main drainage situation results.

A few " sporting " examples of this condition may be of interest here. Whilst inspecting this same drainage problem with Major Graham, I.M.S., in January, 1913, my wife and I put up and shot a tiger, 2 leopards and a swamp deer in this precise area in one day ! The same tract contains no fewer than 7 famous tiger " beats " and is a world renowned haunt of the " black " (swamp) partridge. On the other hand the country to the south of the M. T. Road is frequented mainly by grey partridge—the dry variety.

It is true that run-off would be vastly improved by de-foresting and de-grassing the area, but the unstable river bed conditions would remain unless specially treated, *see* paragraph 8.

5. The river system

A glance at the map (or a view of the tract from " Land's end " in Naini Tal, on a clear day) will show that the tract in question is drained as follows :

(*a*) To the East parallel with and close to the R. K. Railway by the Gaula-Kichha river which is a shallow fierce-spated torrent in heavy rain.

To the West, the Bhakra, rising in the Fatehpur-Naini Tal hills and flowing past Gularbhoj station to the west of the tract.

These are " primary " or hill-fed streams.

(*b*) In between are a series of secondary or local torrents which rise in, or just above the Bhabar end drain both the upper and lower zones, e.g. the Baror, west of Kicha, the West Baigul, east of Rudarpur and the Dimri on the western boundary.

These streams which are mainly fed from Tarai springs (*see* paragraph 3) in the dry weather carry heavy surface water spates in the monsoon.

(*c*) Interspersed again are the tertiary (or Tarai) streams which have their cold weather origin in Tarai springs and carry moderate local spates in the rains. There are about ten of these spaced, say, one stream per mile width of Tarai.

It now remains to examine the hydraulic regime of these rivers as this has a most important bearing on the drainage problem.

The following factors go to determine, in general, the " discharge " (or volume of flow) of a liver :

(*a*) The " longitudinal slope " which is the main factor in fixing the speed.

(*b*) The " cross section " or area of the stream flow a deep and narrow bed induces a higher velocity by reducing surface friction and a broad shallow bed has the reverse effect.

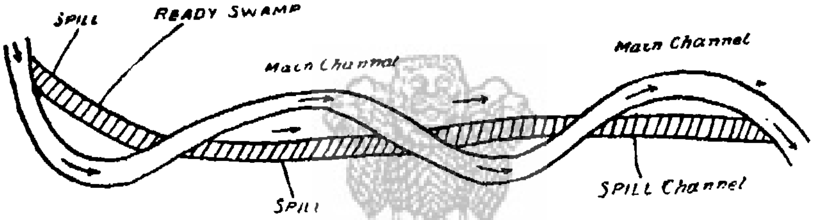
(*c*) The nature of the banks (and bed), whether smooth, solid, clay or rock or grassy slopes.

These will now be considered with reference to the Tarai conditions.

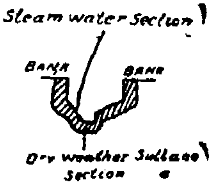
6. The river system and its drainage disabilities

The main cause of the defective drainage system is inherent in the rivers themselves. The Tarai rivers have the following features :

(*a*) Winding courses (" arcs ") especially in the upper reaches.



A—Sketch of typical Tarai stream.



(*b*) Duplicated or even triplicated channels forming 'chords' across the 'arcs' above.

(*c*) Obstructed cross drainage due to (*b*).

(*d*) Excessive cross section due to the extreme variations in flow obtaining between years of normal and abnormal rainfall.

(*e*) General instability of flow (as per sketch) due to interaction between features (*a*), (*b*) and (*c*) above.

[It has been suggested by certain " enthusiastic amateurs " that (*a*) should be remedied by cutting through the loops or " arcs " and regardingthe rivers ; that (*b*) should be "bounded off "that masonry " inlets" should be prepared to relieve (*c*) and finally that the streams should be canalized to eliminate (*d*) (*e*). The new flood cross section would be based on normal monsoon flow and the bed would be "cunetted " (like a municipal drain carrying sullage) to carry the dry weather stream flow.

This would all be practicable if nature operated on indoor or theoretical lines—like the office table reformer—but unluckily she does not, especially in her main strongholds.

Dealing briefly with the causes of these phenomena we may outline them as follows :

(*a*)—(*d*) *Winding rivers.*—The original streams probably ran straight down north to south from the foothills and across the Bhabar and Tarai. The slope being excessive, especially in the upper reaches, and the tenacity of the soil poor the rivers generated a higher *velocity of flow than the soil of the banks and bed would withstand. The banks caved in the bed silted up and the river began to " wind " in order to reduce its " gradient " and thus its speed be lengthening its bed—hence the arc (*a*). During periods of high rainfall especially in cyclonic bursts such as occur once in, say, 10 years in the sub-Himalaya, the run-off is terrific and the river section is unable to pass its enhanced volume hence the stream breaks across the " chords " opening up the older channels. During the subsequent flood subsidence period, the " arc " or the " chord " or both silt up and the aggregate channel cross section again becomes proportionate to the normal monsoon flow. Thus a state of "channel semi-stability" is reached for the time being leaving a variety of old and partly new beds. The old beds which contain more silt fill up with weeds and reeds† and the new ones with sandbanks which rapidly grass over. The whole Tarai is intersected with " unstable "rivers of this type some of them originating in the upper or " spring " belt, others coming into the Tarai from the Bhabar and still others originating in the Naini Tal hills.

(*e*) *Unstable flow.*—All are subject to the discharge vagaries due to unequal rainfall and all are longitudinally " unstable " owing to the rapidly changing country slopes.

These rapid changes in the river gradient are illustrated by the following approximate figures. The gradient of the lower Naini Tal—

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*The general hydraulic formula for velocities in channels is of this order.

$V = C\sqrt{RS}$ / $V = 100.C.\sqrt{RS}$ where V. velocity generated.

C = A coefficient depending on surface friction.
R = the average hydraulic depth.
S = the gradient of the bed.

Thus if a stream, say 100 feet wide and 4 feet deep, flows down a slope of 1/400 through poor soil, it may develop a velocity as high as

$$V = 100 \times \cdot 6 \times \sqrt{1/400 \times 3\cdot 7}$$

$= $ say 6 feet sec.

The soil is underent, the banks fall in and the river begins to wind.

†Hence the famous " nerkles " or tiger swamps of the Tarai.

Kathgodam road is roughly 1/30 or 170' per mile ; from Kathgodam to the Bhabar edge at Haldwani is, say, 100' per mile or 1/53 ; from Haldwani to Lalkua, upper Tarai edge, the grade is 1/70 or about 75' per mile and from Lalkua to Kichha, i.e. in the zone itself the slope decreases from 1/1000 (50' to 5280) to 1/200 (26' per mile) on a parabolic curve. These changing gradients which are unalterable and adverse features of the submontane tract constitute nature's principal weapon of attack. They are responsible, in conjunction with a heavy and irregular rainfall, for the erratic condition of the rivers thereby creating an arena in which any antagonist of nature will for ever fight at the maximum of tactical disadvantage. One is tempted here to ask why such a terrain should be chosen as a battleground.

7. The tarai canal system as a contributory cause of flooding

It will be seen that the main cause of flooding and malaria is inherent in the hydrological conditions of the Tarait racts, this is dealt with in paragraph 6 above.

A secondary cause, and one which can definitely be eliminated, is the unscientific layout of the local canal system.

The canals which date from about 1870 are described in *Mr. C. H. Hutton's excellent report dated 1903.

The channels are taken off the local spring fed streams by means of regulators, mostly sited above the zone in question, and irrigate some......acres out of the......acres cultivated in the Tarai area.

The Kichha-Rudarpur canals were "remodelled" by Mr. G. F. Dawson, Executive Engineer, Tarai in 1907--1910 on the orthodox lines of a distribution system in the "plains". In order as he thought, to give more local "command", the water level (F. S. L.)† was raised by means of masonry falls to an average height of 9"—1' above ground. This is admittedly the usual practice in the plains but there is this difference. In the lower Ganges valley the country slope is 9" to 12" per mile (1/6000) and in the Tarai 12" to 20' per mile or 1/300. Thus whereas in the plains it is necessary to keep the canal F. S. L. at or just above ground, such a practice is entirely unnecessary to secure command in a terrain with such a steep slope. Not only is it unnecessary (as local field "command" can obviously be obtained within a furlong) but the practice is positively dangerous. The banks being of inferior soil, are easily breached both by cattle and human agency thereby causing local flooding. Further, the high F. S. L. causes, *see* page'' through and under the porous banks thereby further raising an already high spring level. Finally, canals operated on such a system tend to check the drainage and thus generally upset the hydraulic regime of the tract. These conditions are aggravated by the lack of supervision in the rains due to inadequate communications. In 1916 I left a project with my successor for lowering the F. S. L. to a depth averaging 1' below ground level ; I believe it is still pigeon holed in the office. Mr. Russell, the present Executive Engineer who agrees with me that this lowering should be carried out would even, I gather, go further and abolish the canal system altogether. I doubt whether this would be sound as in some years sugarcane could not be maintained without irrigation. Anyhow, the lowering the canal water level to a maximum depth of 1′ below ground level is most strongly recommended throughout the Tarai and, more especially, in the tract in question. Canals can thus, to some local extent, be made use of as drains during the monsoon.

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*One of the Tarai and Bhabar Estates Engineers; later, Chief Engineer, Irrigation, United Provinces.

†(Full supply level.)

I have today recommended this practice in conversation to Mr. Zaidi, Chief Minister, Rampur State, for consideration with reference to his own canal system. For a comparatively small capital sum, the main Rampur canals could be lowered 2 to 3 feet in the upper reaches thereby effecting considerable relief against water-logging in heavy rain.

8. During the discussions at Rudarpur and Naini Tal, various remedial measures were put forward which may be examined as follows :

(*a*) It was accepted that the main rivers which drain the Naini hills (Kichha, Bhakra) should be left being too vast to tackle.

(*b*) Could the secondary rivers, e.g. Baror and west Baigul be straightened and canalized ?

The answer lies in paragraph 6 above. To realign these rivers would create such a velocity in even normal floods that either (i) the banks would have to be revetted to stand the flow, or (ii) "falls" would have to be inserted to reduce the velocity, at the same time widening the bed to pass the required flood discharge.

Moreover, the existing "spill" channels would have to be filled up and or/drained. Where would the earth come from ?

The initial outlay on these major works would be prohibitive and out of all proportion to the benefit derived. Moreover, as the *occasional* maximum flow is so high compared with the " ordinary " flood discharge, the revetment works and/or the masonry falls, would be gravely menaced* in high floods, necessitating heavy capital renewals every 10 or 12 years.

(*c*) Could the smaller local drainages be "intercepted" by a large scale "contour" drain aligned across the Tarai above the zone in question and emptying into the main rivers ?

This tentative suggestion was made by Dr. Bannerji at Rudarpur. The answer is that this could be done, but only at immense cost in construction and upkeep. Such a canal would *ex hypothesi* be crossing the drainage and would thus have little gradient. As such, the bed width would necessarily be large and the depth would have to be taken below spring level. Such a canal could only pass the ordinary flood discharge and would be breached and silted up by the "occasional" high floods. I cannot conceive of a poorer engineering investment.

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*Outflanking of falls, undercutting of revetments and aprons, unless protected by block and/or piling.

(*d*) Could not the upper portion of the area to the north of the M. T. road be re-afforested leaving a belt of grass land immediately north of the road as an insulating zone ? The colonization scheme to be restricted to the south of the road and north of the Rampur State boundary ?

The unanimous opinion of the Forest officers present at the second conference was that the planting of timber on a commercial scale in the Tarai zone is impracticable. Owing to the high spring level and inadequate drainage, valuable hard woods will not grow and the growth of secondary trees is fortuitous.

The Forest officers were strongly of opinion that any attempt to systematise the forests of the lower Tarai on a commercial scale would end in failure.

Mr. W. T. Hall, the Chief Conservator of Forests, who has known the Tarai for many years as Special Forest Officer, Tarai and Babar and as Divisional Forest Officer, Haldwani and Ramnagar division, which border it on the north, expressed his opinion most emphatically that any scheme of Tarai drainage was impracticable at economic cost and could not achieve the end in view, i.e. a habitable settlement for ex-soldiers.

Mr. F. H. Hutchinson, Superintending Engineer, Tube-well Ganges canal, and a former Exective Engineer, Tarai and Bhabar Estates, was also of the definite opinion, after reading my notes, that the drainage of the Tarai tract in question was an impracticable proposition except at great cost in capital and maintenance. Mr. Hutchinson was doubtful of the proposal to hold the Main Tarai road line as a strong point and develop a colony to the south. He emphasized the possibility of an alternative proposal, i.e. to split up the colony into groups round each of a series of contiguous tube-wells in Moradabad or Budaun. I deal with this in paragraph 9 below.

Mr. Shelly, whom I knew years ago when he was Executive Engineer, Tarai and Bhabar, also told me that he viewed with deep distrust any large scale scheme to drain the Tarai.

Finally I attach as an appendix a letter from Mr. Kautiyal, Special Forest Officer, Tarai and Bhabar, who was present at the second conference. Mr. Kautiyal as a "Garhwali", speaks from both angles.

It must be admitted that the overwhelming evidence of practical officers with a working knowledge of the Tarai supports my belief that the proposal is unsound and borders on the fantastic.

9. Alternative proposal

The remarks recorded above indicate that I personally, together with those officers in the United Provinces both engineer and forest, who have an intimate knowledge of Tarai conditions, consider the proposal to drain and develop this tract to be an unsound one from all points of view. Not only would this scheme be extremely costly to carry out and maintain physically, but psychologically it would not inspire the public—and particularly ex-soldiers who are expecting safety and comfort in retirement—as being a work of utility.

Let one imagine the reactions (and remarks!) of a war weary British soldier when told by the demobilization officer on return from Tunis or Salonika that he was to be sent to the Gold Coast as the gesture of a grateful country. This, I believe, is a true parallel.

If, on the other hand, capital on the scale visualized is available, why not invest it in creating colonies in the sandy but healthy *bhur* tracts of Moradabad and Bijnor. Such tracts which can be levelled at a fraction of the cost of draining the Tarai (and by the same means—tractors) possess the following amenities :

(*a*) Normal rainfall and dry healthy soil.

(*b*) Ample underground water of good quality available for tube-well pumping on a wide scale at an economic depth (15 feet).

(*c*) Hydro-electricity available throughout the tract for pumping and agriculture at a rate of Rs.80 per H. P. year (less than half an anna per unit at 45 per cent. load factor).

(*d*) Roads and railways adjacent.

(*e*) Cool dry nights in the hot weather due to rapid radiation of heat from the sandy surface.

(*f*) *Bhur* soil, if adequately treated with humus in the initial stage, can be developed for agriculture in two years, according to the precedent established by Sir Sri Ram and Chaudhri Mukhtiar Singh at the Daurala Sugarcane Farm (5 miles north of Meerut) in 1933—35. I backed this scheme by constructing an 11,000 volt rural pumping line in 1933 which has energized some thirty tube-wells. The tract once a sandy waste, is now a smiling sugar garden ?

W. L. STAMPE,
Irrigation Adviser to the
Government of India.

APPENDIX

Copy of letter, dated June 19, 1943, *from* S. R. KAUTIYAL, ESQ., *Special Forest Officer, Tarai and Bhabar Forest Division, Naini Tal, to* SIR WILLIAM STAMPE, C.I.E., *Irrigation Adviser to the Government of India.*

Last time that I had the privilege of meeting you, you were pleased to enquire as to the possibility of post-war soldiers from Kumaun availing themselves of grants of land in the proposed soldiers colony in the Naini Tal Tarai. My personal opinion is that the hill people have such a deep-rooted prejudice against the notoriously unhealthy climate of the Tarai tracts that it will need considerable time and propaganda to make them believe that the areas can be permanently habitable even after they are reclaimed and improved under the proposed scheme. Moreover, practically every hill man owns land, even though not always sufficient for his requirements, in his village in the hills and is too conservative to leave his village community and society to settle somewhere else. I am, therefore, personally very doubtful if any post-war soldiers from Kumaun, more particularly from Garhwal which happens to be the farthest from the proposed colony, will be willing to settle in it. This, however, is my opinion as a private individual from Garhwal and is subject to correction by persons and authorities more competent to express an opinion in the matter.

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APPENDIX VIII

(*a*) Note on anti-malarial measures in Naini Tal Tarai Colonization Scheme.

(*b*) Estimate for the post of a Chief Medical Officer to Control the antimalaria operations in Naini Tal Tarai, Bijnor and Kheri Colonisation areas.

(*c*) List of articles required for anti-malaria measures.

(*d*) Tube-well Circle, Irrigation Works.

(*e*) Abstract of working expenses of a standard tube-well.

(*f*) Abstract of working expenses of a diesel pumping set.

(*g*) Draft of proprietary lease.

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APPENDIX VIII-(A)

Note on anti-malarial measures in Naini Tal-Tarai Colonization Scheme by Rai Bahadur Dr. A. N. DAS. M.B., Dr. Ph., Assistant Director of Public Health (Malariology), United Provinces.

Malaria is dependent on —

(1) infective mosquito,

(2) susceptible individual,

and (3) bite of a susceptible individual by an infective mosquito.

Its control will therefore involve consideration of the above items.

2. *Control of mosquitoes*—

(i) Against adults .. Spray with insecticides. Remove hiding places.

(ii) Against larvae .. Apply larvicides gambusia in selected collections.

(iii) Reduce breeding grounds—

(*a*) Ensure proper drainage. Abolish canals.

(*b*) Limit wet cultivation within ½ mile.

(*c*) Filling.

(*d*) Canalizing rivers and *nalas*.

(*e*) De-weeding.

(*f*) Sub-soil drainage.

(*g*) Flushing-automatic syphon.

(iv) Reduce infectivity of mosquito by providing treatment to patient, suppressive, curative and prophylactic (paludrine ?).

3. Reducing susceptibility of individuals—

(i) General benefication measures like good communications, sanitary surroundings, good water supply, healthful living, recreational facilities, education, child and maternity welfare, nutritious food, damp-proof, ventiliated and lighted houses.

(ii) General economic uplift.

(iii) Protection against wild animals and thereby obviating the necessity of strenuous night watches.

4. Protection from bites of mosquitoes—

(i) Mosquito proof houses.

(ii) Use of mosquito nets.

(iii) Use of repellents.

(iv) Protective clothing.

(v) Proper siting of villages.

5. To carry out the above programme there must be—

(i) A long range policy of malaria control on a long-term basis.

(ii) A resident trained anti-malaria organization.

(iii) Sufficient funds at the disposal of malaria organization.

(iv) Legal measures to ensure anti-malaria discipline.

(v) A perfect liaison with other activities.

(vi) Benefication measures like improved farming, communications, protections, against wild animals, etc. These should go hand in hand with anti-malarial measures.

(vii) Discipline among settlers legally enforced, if necessary.

6. Financial considerations—

I.—Pay of anti-malaria staff—

	Rs.
(1) Anti-malaria officer Rs. 250—15—400—20—600—25—650	3,000
Special pay at Rs.50 per mensem	600
Cost of living allowance at Rs.17½ per cent. on Rs.3,600 ..	630
(2) Malaria Supervisors (5) at Rs.100 per mensem each ..	6,000
Special pay at Rs.20 per mensen each	1,200
Cost of living allowance at Rs.22 per mensem each ..	1,320
(3) Mates (5) at Rs.40 per mensem each	2,400
Special pay at Rs.8 per mensem each	480
Cost of living allowance at Rs.22 per mensem each ..	1,320
(4) Anti-malaria gang (25) at Rs.30 per mensem each ..	9,000
Special pay at Rs.6 per mensem each	1,800
Cost of living allowance at Rs.22 per mensem each ..	6,600
(5) Mistri (1) at Rs.60—5—90 per mensem	720
Special pay at Rs.12 per mensem	144
Cost of living allowance at Rs.22 per mensem ..	264
(6) Motor driver (1) at Rs.60—5—90 per mensem ..	720
Special pay at Rs.12 per mensem	144
Cost of living allowance at Rs.22 per mensem ..	264
(7) Laboratory assistants (2) at Rs.60—5—90 per mensem ..	1,440
Special pay at Rs.12 per mensem each	288
Cost of living allowance at Rs.22 per mensem each ..	528
(8) Insect Collectors (2) at Rs.40—2—50 per mensem ..	960
Special pay at Rs.8 per mensem each	192
Cost of living allowance at Rs.22 per mensem each ..	528
(9) Clerk (1) at Rs.50—5—90 per mensem	600
Special pay at Rs.10 per mensem	120
Cost of living allowance at Rs.22 per mensem ..	264
(10) Peon (1) at Rs.15—1—25 per mensem	180
Special pay at Rs.3 per mensem	36
Cost of living allowance at Rs.16 per mensem ..	192
(11) Sweepers (2) at Rs.12 per mensem each	288
Special pay at Rs.2-8-0 per mensem each	60
Cost of living allowance at Rs.16 per mensem	384
II.—Allowances and Honoraria—	
Fixed travelling allowance to medical officer at Rs.50 per mensem	600
Fixed travelling allowance to 5 Supervisors at Rs.25 per mensem each	1,500
Total ..	44,766

	Rs.
III.—Anti-malaria drugs and spraying materials—	
Anti-malaria materials*	40,000
Motor sprayers (5) at Rs.600 each	3,000
Laboratories and field equipment	4,000
Drugs—Quinine, mepacrine paludrine	1,500
IV.—Furniture and other equipment—	
One motor truck	6,000
Petrol and mobil oil	2,400
Furniture	1,000
V—Buildings for personnel, L. S.	1,26,000
VI.—Contingencies, L. S.	10,000
VII.—(*a*) *Hospital buildings and equipment*	1,34,000
(*b*) *Staff* including Sub-Assistant Surgeon and midwives, compounders, medicines and drugs	30,000
VIII.—Sanitation—	
Sweepers (10) at Rs.11 per mensem each	1,440
Special pay at Rs.2-8-0 per mensem each	300
Cost of living allowance at Rs.16 per mensem each	1,920
Jamadar (1) at Rs.15 per mensem	180
Special pay at Rs.3 per mensem	36
Cost of living allowance at Rs.16 per mensem	192
Contingencies	1,268
7. *Summary—*	
(i) Non-recurring	2,72,000
(ii) Recurring	1,36,000
Total	4,08,000

*NOTE.—This includes cost of 3 tons of D. D. T. powder which will be required for 700 houses (700 families or 3,000 men) and roughly 1 square mile of water surface to be treated. If the village consists of a unit of only 400 houses, the cost will proportionately increase, due to larger water surface to be treated, large cost in transport and supervision. Thus it will be better to have one village of 700 houses rather than two villages of 350 or 400 houses each.

APPENDIX VIII-(b)

Estimates for the post of a Chief Medical Officer to control Antimalaria operations in Naini Tal Tarai Bijnor Kheri Colonisation areas

	Rs.
(1) Pay of officer (Malariologist) at Rs.900—50—1,250 per mensem	10,800
Special pay at 20 per cent.	2,160
Cost of living allowance at 17½ per cent. on Rs.12,960	2,268
Travelling allowance	3,000
(2) Accountant (1) at Rs.100—5—150 per mensem	1,200
Special pay at 20 per cent.	240
Cost of living allowance at 17½ per cent. on Rs.1,440	252
(3) Clerk (1) at Rs.50—5—90 per mensem	600
Special pay Rs.10 per mensem	120
Cost of living allowance Rs.22 per mensem	264
(4) Peon (1) at Rs.15—1—25 per mensem	180
Special pay Rs.3 per mensem	36
Cost of living allowance Rs.16 per mensem	192
(5) Orderlies (2) at Rs.20—1—30 per mensem each	480
Special pay Rs.4 per mensem each	96
Cost of living allowance Rs.16 per mensem each	384
(6) Sweeper (1) at Rs.12 per mensem	144
Special pay at Rs.2-8-0 per mensem	30
Cost of living allowance Rs.16 per mensem	192
	22,638
Furniture and equipment	2,000
Contingencies	2,362
Total	27,000

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APPENDIX VIII-(c)

List of articles required for anti-malaria operations

Chemicals and drugs

(1) Alcohol absolute	2 lbs.
(2) Alcohol Methyl. (acetone free)	4 ,,
(3) Alcohol Amyl.	1 lb.
(4) Chloroform..	2 lbs.
(5) Glycerine bidistilled	4 ,,
(6) Cedarwood Oil	250 grams.
(7) Canada Balsam Collapsible tubes	12 tubes.
(8) Azure II Eosin	20 grams.
(9) Azure II	10 ,,
(10) Giemsa's stain	10 ,,
(11) Leishman's stain	5 grams.
(12) Gentain violet	1 ,,
(13) Tulodine blue	5 ,,
(14) Xylol	1 lb.
(15) Sodium chloride tablets	150 grams.
(16) Creosote ex-beechwood	1 lb,
(17) Carbolic acid	1 ,,
(18) Nitric acid	1 ,,
(19) Acetic acid glacial	1 ,,
(20) Formalin	8 oz.
(21) Calcium chloride (granulated)	1 lb.
(22) Lysol	5 lbs.
(23) Plasticine	1 lb.
(24) Washing soda	4 lbs.
(25) Caustic Potash	1 lb.
(26) Gelatine	3 lbs.
(27) Spirit rectified	4 gallons.
(28) Spirit methylated	6 ,,
(29) Fowl cell suspension	1 lb.
(30) D. D. T.	3 tons.
(31) Kerosene oil	13,500 gallons.
(32) Toluene	4 ,,
(33) French chalk	2 cwts.
(34) Pyrethrum extract 1 per cent.	40 gallons.
(35) Cinchona tablets	10 lbs.
(36) Quinine tablets	10 ,,
(37) Mepacrine hydrochlor tablets	25,000 tabs.
(38) Palidrine	1,000 ,,
(39) Pamaquine	5,000 ,,

Glass articles

(1) Glass sheets 12″×8″		24
(2) Glass tube fitted with cork for use with capillary lymph tube		6
(3) Capsules with rings		6
(4) Glass cells with lids		4
(5) Specimen tubes with corks	(3″×1″)	4 gross.
(6) Ditto ditto	(2″×½″)	4 ,,
(7) Test tubes without rims	(6″×3″)	4 ,,
(8) Cover glass (3/4″) no. 1 square		2 oz.
(9) Jars with screw tops (Capy 1 and 2 lbs.)		4 each.
(10) Hurricane lamp chimneys		6
(11) Measure glass (1 oz. 2 oz. and 4 oz. capacity)		2 each.
(12) Measure cylinder (100 c. c., 50 c.c. and 10 c.c.)		2 ,,
(13) Drop bottles (2 oz. capacity)		6

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(14)	Bottles N. M. glass stoppered (2, 4 and 8 oz. capacity)	6 each
(15)	Glass stoppered bottles W. M. (2, 4 and 8 oz. capacity)	6 ,,
(16)	Glass stoppered bottles W. M. (1 and 2 lbs. capacity)	6
(17)	Desiccator	1
(18)	Cedarwood oil bottle	2
(19)	Microscopic glass slides (3″ × 1″)	50 gross.
(20)	Glass tubing (piece of 12″ length)	2 lbs.
(21)	Spirit lamp glass with wick	2
(22)	Petri dishes	4 pairs.
(23)	Watch glass	12
(24)	Fixing jars	2
(25)	Glass blocks with excavation and cover	6
(26)	Bell jars, for microscope	3
(27)	Pestle and Mortar (glass)	2 sets.
(28)	Wash bottles	2
(29)	Beakers with spout	4
(30)	Funnels, large and small	4 each.
(31)	Finger bowls	12
(32)	Glass staining troughs	6
(33)	Dropper with rubber teats	24
(34)	Capillary lymph tube	5,000

Instruments

(1)	Microscope for routine diagnostic purposes	1
(2)	Ditto dissecting	2
(3)	Magnifiers (7 X, 10 X and 22 X)	1 set.
(4)	Do. aplanatic 10 X	1
(5)	Do. double folding	2
(6)	Prismatic compass with plane table and stand, etc.	1 set.
(7)	Haemocytometer, Zeiss (complete)	1
(8)	Haemometer, sahli	1
(9)	Thermometer wet and dry bulb	1 set.
(10)	Do. maximum-minimum	1 ,,
(11)	Do. clinical	10
(12)	Electric torch 2 cells (complete)	3
(13)	Spring steel measure (marked in inch and millimeters)	6
(14)	Steel rule	1
(15)	Rain gauge, complete	1 set.
(16)	Copper still, water heater (2 gallon capacity)	1 ,,
(17)	Bunsen burner	1 ,,
(18)	Primus stove	1
(19)	Physical balance, complete with set of weights in box	1
(20)	Forceps dissecting	6
(21)	Do. entomological	6
(22)	Scalpel	2
(23)	Scissors straight round shanks (5″)	4
(24)	Do. entomological fine pointed	4
(25)	Dissecting needles (plane wooden handle)	12
(26)	Ditto holders with clamp to screw	6
(27)	Set of drawing instruments	1
(28)	Tool-set (saw 10″, hammer, screw driver, pliers)	2
(29)	Writing diamond with wooden handle	1
(30)	Needles, ordinary sewing no. 6	2 dozens.
(31)	Do. surgical hagedorn no. 7	6 ,,
(32)	Pins entomological (pointed), nickle taylor no. 3	3 oz.
(33)	Pin entomological white no. 16	2 oz.
(34)	Comparator Loviband with accessories	1
(35)	Hone for sharpening instruments	1
(36)	Pestle and mortar wedgewood	2 sets.
(37)	Glass cuting knife	1
(38)	Syringe original record 5 c.c.	1
(39)	Hypodermic needles for above	3 dozens.
(40)	Cork-borer metallic	1 set.
(41)	Cork pressor	1
(42)	Cork screw with tin cutter	2
(43)	Spatula with wooden handle	2
(44)	Wire gauge, asbestos (6″ × 6″)	4

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(45)	Stethoscope, superior quality	1	
(46)	Slide boxes card-board (for 100 and 50 slides)	6	each.
(47)	Ditto to hold 20 slides	6	
(48)	Grease pencils	1	dozen.
(49)	Dermatograph pencils	1	,,
(50)	Cork sheets (11″ × 1/16th″)	12	sheets.
(51)	Entomological store box	4	
(52)	Filter paper	4	pkts.
(53)	E. I. trays (10″ × 8″)	12	
(54)	E. I. spoons	24	
(55)	E. I. bowls (5″ dia.)	24	
(56)	E. I. laddles	6	
(57)	E. I. wash basins	6	
(58)	E. I. jugs	2	
(59)	E. I. and G. I. buckets	6	each.
(60)	E. I. soap dish	3	
(61)	Petromax	2	
(62)	Ordinary hand lanterns	2	
(63)	Measuring tape in leather case 100′	2	
(64)	Ditto ditto 50′	2	
(65)	Rubber tubing 1/12″ dia.	30	yards.
(66)	Ditto ¼″ dia.	20	,,
(67)	Brushes, camel hair	12	
(68)	Do. ordinary for cleaning glass bottles, etc.	12	
(69)	Stirrup pumps	15	
(70)	Jimdandy sprayers	6	only.
(71)	Mesh Flit or shelltox sprayers	24	
(72)	Shoulder sprayers with lances	6	
(73)	Motor sprayer	1	

Miscellaneous

(1)	Haversacks	6	
(2)	Cotton wool	12	lbs.
(3)	Lint absorbent	6	,,
(4)	Gauze	1	*than.*
(5)	Bristol Board	6	
(6)	Hand nets	4	
(7)	Wellnet with rope	3	
(8)	Handkerchiefs, cotton	6	
(9)	Silken handkerchiefs	3	
(10)	Aprons	24	
(11)	Towels	12	
(12)	Barraudi's boxes	4	
(13)	Mosquito hotels with wire frames 12″ × 12″	12	
(14)	Do. netting	30	yards.
(15)	Muslin	10	,,
(16)	Galvanized iron drums (40 gallons capacity)	5	
(17)	Do. from drums (5 and 1 gallon capacities)	10	each.
(18)	Dusters	12	
(19)	Wooden racks for specimen tubes	12	
(20)	Ditto test tubes	6	
(21)	Ditto drying slides	6	
(22)	Hoes	12	
(23)	Pick-axes	12	
(24)	Hatchets	12	
(25)	Axes, wood cutting	4	
(26)	Sickle	6	
(27)	*Khurpi*	6	
(28)	Secotine	2	tubes.
(29)	Galvanised iron funnels	6	
(30)	Mugs	6	

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APPENDIX VIII (D)

Tube-Well Circle, Irrigation Works

Estimate for type 1·5 cubics tube-well with horizontal pump with pipe line

Description	Well no.	Q—Equipments								Civil works										Syphons							Remarks
		Work charged establishment	Boring	Transport	Blind pipe	Strainer	Total Tube	Plant and accessories	Total—Equipment	A—Preliminary	B—Land Permanent land	B—Land Temporary land	Sump and pump house	Boundary stones	Pipe line complete	Line channel	Head sump	Inter sump	End sump	Service roads	Unlined channels	Metalled road	Unmetalled road	Service road	Work charged establishment.	Total, C Works	
1	2	3	4	5	6	7	8		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Unit	No.	No.	Feet	Job	Feet	Feet	..	..	..	No.	Acre	Acre	No.	No.	No.	Mile	No.	No.	No.	M	M	No.	No.	No.	No.	..	
Quantity	1	1½	300	1	200	100	..	1	..	1	2	3	1	4	⅝	⅛	1	⅓	1½	1·25	2·5	·1	3	4	2	..	
Rate	..	60	4/—	200	5/—	18	..	2,729	..	20	300	36	2,200	5	8,800	5,600	650	360	100	350	640	400	150	100	60	..	
Amount Rs.	..	90	1,200	1,200	1,000	1,800	4,290	2,730	7,020	20	600	108	2,200	20	5,500	700	650	120	150	450	1,600	40	450	400	120	12,400	
Contingencies 5 per cent. ..	..	5	60	10	50	90	214	136	351	1	30	5	110	1	275	35	33	6	7	23	80	2	22	20	6	620	
Total amount ..	..	95	210	210	1,050	1,890	4,504	2,866	7,371	21	630	113	2,310	21	5,775	735	683	126	157	472	1,680	42	472	420	126	13,020	

Abstract

A—Preliminary	..	21
B—Land ..	..	743
C—Works ..	..	13,020
Q—Equipment	..	7,371
Total	..	21,155

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APPENDIX VIII (e)

Abstract of working expenses of a standard tube-well

12½ H. P. PUMPING SET

		Rs.
(i)	M. and R.	250
(ii)	Operating staff	300
(iii)	Revenue and Collection establishment	180
(iv)	Divisional Establishment	300
(v)	Leave and Pensionary charges	60
(vi)	T. and P. 2 per cent. of (i)	5
(vii)	Indirect charges (audit, etc.) 1 per cent. of (i) and (ii) ..	5
(viii)	Energy charges at Rs.80 per B. H. P.	1,000
(ix)	Depreciation at 3—15 per cent. of capital Rs.21,000 ..	683
	Total ..	2,783
(x)	Interest at 3½ per cent. on capital cost Rs.21,000 ..	715
	Total ..	3,518
	Say ..	3,500

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APPENDIX VIII (f)

Abstract of working expenses of a diesel pumping set

10—15 H. P. 1½ CUSEC YIELD

Staff	*Rate*	*Amount*
	Rs.	Rs.
One driver	60 per mensem ..	60
One assistant and cleaner ..	40 ,, ..	40
Two coolies	30 ,, ..	60
	Total, staff ..	160

Say, Rs. 5·3 per day.

Fuel and Material—

	Rs.	Rs. a.
Diesel oil 8 gallons per day ..	1 per gallon ..	8 0
Lubricating oils ¼ gallon per day and grease ..	6 ,, ...	1 8
Miscellaneous articles cotton waste, etc.	Lump sum ..	0 2
Annual maintenance, overhaul and replacements of parts at Rs.350 per year ..	,, ...	1 0
	Total ..	10 6 per day.
Total, staff and material ..	Rs.	15·9
	Say Rs.16 per day.	
Average daily irrigation 4 acres.	Cost per acre watering ..	4 0

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APPENDIX VIII (g)

Draft of the proprietary lease for land to be leased from zamindars for the ex-soldiers' settlement scheme in the United Provinces

THIS deed of lease made this............day of..........19 BETWEEN the ZAMINDAR .... (hereinafter called "the Lessor") on the one part, and the Land Settlement Co-operative Society (hereinafter called "the Lessee") on the other part. *Witness as follows* :

WHEREAS the LESSOR owns land measuring.................. equivalent to..............acres situated in mohals............... in village..................in pargana.................. tahsil ...., district...................... forming part of the.......................Estate, more fully described in the *khasra* numbers in the schedule hereinafter written and marked as Annexure "A" hereinafter referred to as the "LEASED LAND."

AND WHEREAS most of the said "LEASED LAND" is lying uncultivated and is yielding little income to the said Estate.

AND WHEREAS it would be to the benefit and in the best interests of the Estate to let out the said LAND so that it may be developed and improved and thus bring a permanent substantial income to the Estate.

AND WHEREAS the LESSEES above-named desire to take the said Land on lease for industrial and agricultural purposes on the terms and conditions as hereinafter contained, and the LESSOR is equally desirous to LEASE it in due course of the management of the Estate, with a view as detailed above.

NOW, THIS INDENTURE WITNESSETH and it is hereby agreed between the PARTIES and declared as follows :

1. THAT THE LESSOR doth hereby demise unto the LESSEE above named all the above-mentioned leased land measuring........ acres, situated in the above-mentioned mahals, more particularly described in Annexure "A" with all appurtenances in anywise relating to the said land for the term of 99 years with effect from................ 19............provided that the LESSEE shall have the option of terminating the LEASE in any year of the first fourteen years of the Lease and thereafter at the close of every fifth year. Provided that (1) one year's previous notice in writing to the Lessor, expiring with the month of June, shall be given to the Lessor by the Lessee of his intention to terminate the Lease, (2) that such option shall not be exercisable, before the 30th June, and (3) that the termination shall be of the whole lease and not piecemeal.

2. THAT THE LESSEE shall pay Rs...............(Rs......... ....) only which is calculated at the flat rate of Rs. 4 per acre per annum as the rent for the Leased Land, but as a concession shall pay Rs...................(Rs........................ which is calculated at one-quarter of the aforesaid flat rate per annum annually for the first four years of the lease and the full rent,

of Rs..............from the fifth year up to the end of the lease. This rent hereinafter called the "LEASE MONEY" shall be payable in two equal six-monthly instalments payable on October 1 and April 1 of each calendar year. **Provided that** the LESSEE shall be liable to pay interest at the rate of 6 per cent. per annum on all instalments of LEASE MONEY, remaining unpaid on their respective due dates and all money paid by the Lessee shall, in the first instance, be applied to the payment of interest due, if any. But in no case shall this lease money be enhanced or abated otherwise, than as provided herein. **Be it also** stated that it is well understood and has been agreed upon by and between the parties hereto that the concessional rate of lease money for the first six years has been allowed to the Lessee as compensation for such improvements as from their very nature cannot be removed or taken away in terms of paragraph 12 hereof. But in no case shall the rent during the concessional period be enhanced.

3. **That** the land revenue, cesses and taxes chargeable from the Lessor now or hereinafter for the LEASED LAND shall be paid by the Lessor, but in case the land revenue and cesses exceed 40 per cent. of the lease money, 40 per cent. of such excess shall be borne by the Lessor and 60 per cent. by the Lessee and shall be realizable as Lease Money. All other rates and taxes, if any, payable under the law by the Lessee shall in all cases be paid by the Lessee.

4. **That** if at any time the area of the Leased Land is decreased by diluvian, the Lessee notwithstanding anything to the contrary herein contained, shall not be liable to pay any rent in respect of such diluviated land and to that extent the Lease Money shall be decreased. Similarly, in the case of alluvian to the Leased Land the Lessee shall have a right if they may so choose to the alluviated land on payment to the Lessor for such alluviated land at the same rate as for the Leased Land.

5. **That** the Lessee shall have full rights to develop and improve the Leased Land and properties comprised in the said land, to develop and improve the products thereof by reclaiming, cleaning, levelling draining including the straightening, widening or deepening of drains, streams and water-courses, walling, fencing, planting, manuring, farming, irrigating and constructing channels and canals and sinking wells and building dams, reservoirs, tanks, conduits, water-courses, pipes wells, ponds, shafts, weirs, sluices and other works and erecting machines and other appliances for the supply and distribution of water for agricultural purposes or for domestic or other consumption and erecting houses, plant machinery, tramways or light railways and brick kilns, laying drains, pipes and machinery for the supply and distribution of sewage of manure, embanking or weiring from a river or lake, constructing granaries, and defence against water, including straightening of fences, re-division of fields and park fencing, reclaiming, dry piping, making private or any farm roads, trenching, planting, making and constructing cottages for labourers, servants, employees and artisans, whether employed on the Leased Land or not, and erecting and constructing houses, offices and out-buildings and buildings for farm or industrial purposes, water-wheels, engine houses and kilns for agricultural or industrial purposes or wood land, and building and setting up markets,

and market places and making streets, roads, paths, squares, gardens or other open spaces, constructing sewers, drains, water-courses, pipe-making, fencing, paving, brick-making and tile-making and other works necessary for, and in connexion with any of the objects aforesaid, and by reconstructing, enlarging and improving any of those works and providing for small dwellings either by means of erecting new buildings or by means of constructing, enlarging and improving the existing buildings and making additions to, or alterations in, buildings reasonably necessary to enable the same to be used and otherwise making the Leased Land culturable or otherwise fit for agricultural industrial or inhabitation purposes, and the Lessee have have full right, power and authority to cut, fell take away, sell or otherwise utilize the existing trees and forests in and upon the said Leased Land and to plantgroves of fruit trees or trees of timber and fuel or any other trees and may cut, fell, sell or otherwise utilize the same and to collect all sorts of fees, grazing and otherwise, and to realize sale-proceeds of *poolas, jharoos,* and *sayar* income and all other income and profits however and whatever, arising from the said Leased Land, whether directly or indirectly.

ALWAYS PROVIDED THAT the Lessee shall not build, construct, erect and put up any sugar factory within the Leased Land without having previously obtained permission in writing from the Lessor which permission shall not be refused by the Lessor unless the granting of such permission is prejudicial to the terms of an agreement executed prior to the present demise and also the Lessee shall not be entitled to any coal, metal or any other mineral product discovered or found in, under and upon the Leased Land or any portion thereof. Such mineral products, etc., shall exclusively belong to the Lessor.

6. (*a*) THAT the Lessee shall be at liberty and be entitled to use the existing tanks, pools, wells, reservoirs, *nalas*, rivers or other water-courses within the Leased Land and may use or sell such water for such purposes as the Lessee may, in his sole discretion think fit, provided such use or sale is not forbidden by any law for the time being in force.

(*b*) THAT the LESSEE shall have the right to sublet their rights in this Lease, either as a whole or piece-meal. PROVIDED also that the Lessee shall not have the right to let out the land to tenants other than members of the Land Settlement Co-operative society.

7. THAT the Lessee shall not acquire any hereditary right in the Leased Land by virtue of cultivating the said land inasmuch as this Lease is primarily for industrial and agricultural proposes combined and not purely for agricultural proposes.

8. THAT the Lessee in order to make the land more compact, regular and convenient and in order to derive the best and full advantage out of the Leased Land and specially to construct light rail ways from any factory to the Leased Land or otherwise shall have the right to exchange any portion or portions of the Leased Land with any other available land of the Lessor, and the Lessee shall have the same rights in the land so given in exchange as in the Leased Land

and shall cease to have any right in the land given in exchange but in case of lands so exchanged the Lessor shall have the right to remove any trees standing within two years.

9. THAT if any available strip or piece of land or lands other than the Lease Land, belonging to the Lessor is needed by the Lessee for the construction of a tramway or a railway for the purpose of their business the Lessor shall lease the same at the settlement rates.

10. THAT the Lessor hereby undertakes to render all reasonable help and co-operation to the Lessee for the requisitioning of such pieces or strips of land or lands as may for the purposes of the Lessees' industries or agriculture of the Leased Land be required by the Lessee for the construction of light railways or tramways from their factories on their leased land to some public road or railway station, etc.

11. THAT at the termination of the Demise hereby created either by the expiry of the Lease or otherwise, the Lessee shall hand over peaceful possession to the Lessor. The Lessee shall not be entitled to get any compensation whatsoever for any improvement but shall have right to remove all their possessions, belongings and properties in and upon the said Leased Land including buildings, cottages, houses, machinery, tools and plant, etc. etc. and pipes, tube-wells and their pipes, conduit pipes, shafts, tramways and railways including their lines, mills and factories together with all their appurtenances and adjuncts, within twenty-four months of the termination of the Demise hereby created and vacate and hand over peaceful possession of the leased lands to the lessor. BE IT ALSO stated that it has been agreed upon between the Lessor and the Lessee that the Lessee shall pay to the Lessor stipulated rent at the rate of Rs.4 per acre per annum for all such lands as are not vacated by the Lessee at the termination of the Demise for such period not exceeding twenty-four months as the lands may remain in occupation of the Lessee, and that after the lapse of twenty-four months the Lessee shall have no right to, or claim on, the Leased Land; and all the property, movable and immovable, then remaining in and upon the Leased Land after the said twenty-four months from the termination of the Demise shall lapse to the Lessor and the Lessee shall have no right or claim to remove them from the Leased Land except as provided in clause 14.

12. THAT the Lessor agrees and covenants that the Lessee paying the lease money regularly and observing and performing the several covenants herein contained shall peacefully enjoy the Leased Land without interruption, let or hindrance by the Lessor or anybody claiming through, under or in trust for the Lessor during the term of the present Demise.

13. THAT the Lessee shall after the expiry of 99 years have the option of renewing this Lease for a further period of up to 99 years on the same terms and conditions as those contained in this Lease, but if it is not renewed, for any further period as a whole, the Lessee shall have the option of getting the Lease of such part of the demised land as may be then covered by buildings renewed for a further period

of 99 years on the same terms and conditions as those contained in this Lease. Provided that such area shall in no case exceed 50 (fifty) acres. Further provided that in case a sugar factory or any other factory is put up in accordance with the terms of this Agreement, an additional area of 50 acres shall be leased to the Lessee on the same terms and conditions as above.

14. IT IS HEREBY AGREED between the parties hereto that—

(*a*) stamp duty, all costs and expenses incidental to the execution and registration of this deed shall be payable by the Lessee ;

(*b*) that every dispute, difference or question which may at any time arise, between the parties hereto or any person claiming under them touching or arising out or in respect of this deed or subject-matter thereof shall be referred to the Commissioner of the Division in which the demised land is situated, whose decision thereon shall be final ;

(*c*) that the expressions "the Lessor" and "the Lessee" hereinbefore used shall unless such an interpretation be inconsistent with the context include in the case of the former his successors and assigns and in the case of the latter his heirs, executors, administrators, representatives and assigns ;

(*d*) that this is a transfer for the purposes of the Crown Grants Act (No. XV of 1895).

IN WITNESS WHEREOF..................................
(THE LESSOR) and the...
acting on behalf and under the authority of the LESSEE in this behalf have signed this deed hereunder on the date and year above first written.

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Lessor

Witness : 1. ——————

2. *Zamindar.*

Lessee

Witness 1. ——————

2. ——————

ANNEXURE "A"

(Showing details of the area hereby demised)

Serial No.	*Name of village*	*No. of plots*	*Total area*

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APPENDIX IX

A note on the Agricultural Development of the area for the Colonization of Ex-servicemen in the Naini Tal Tarai of the United Provinces

BY

C. MAYA DAS, ESQ., M.A., B.SC., I.A.S.,
Director of Agriculture, U. P.

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Scheme for the Development of the Tarai for the Colonization of Ex-servicemen

General—The problem of erosion has been considered to stand in the way of developing these areas. As is revealed from a recent survey of these lands this should not be the case, as authorities on erosion have not thought it worthwhile considering slopes of less than 2 per cent. as important. In this area, the gradient is only ·303 per cent. However, it has been considered necessary to keep this in view and therefore strip farming and bunding have been proposed to prevent erosion.

2. To start with, it is proposed to tackle only 5,000 acres, and to divide it into five farms with an area of one thousand acres each. These farms will be separate units consisting of one State farm, one Collective farm and three co-operative farms. To ward off wild animals it is very necessary to have complete fencing of these farms. This means that approximately 30 miles of fencing will have to be fixed at once. This will be termporary till such time as the fencing of the larger area is taken up.

3. The preliminary work of breaking up these areas will be based upon mechanical cultivation with tractors. The subsequent operations will be done by bullocks and bullock-drawn implements by the members of the Co-operative Society, the Collective farm or the management of the State farm. Once the land has been broken there should be no need to use two tractors each year but the Tarai lands have a tendency to become extremely weedy. Therefore all the cropped land should receive one tractor ploughing and discing once in three or four years.

4. The result of such a plan would be that once the initial breaking has been done it will not be necessary for each co-operative farm to have its own tractor as one tractor would handle 150 acres in the Rabi (September—November), 200 acres in the cane sowing season (December—February), 150 acres in the hot weather (April—June). Again such a plan of pooling tractors would utilise the power of the tractor more fully and economically.

5. By not allowing the tractor to become the property of the Co-operative Society there are better chances of the right type of maintenance with the subsequent advantage of a longer life. All the tractors should be the property of the State, or if it is advantageous to the societies they may be owned jointly by the societies as an item of their investment. Every society will pay for the work done by the tractors on their land and the management of the tractors will be under the Maintenance Engineer on the State farm. (Details given on pages 224 to 326.)

6. In the planning, layout and rotation it is proposed to have low terraces and crop rows across the main slope. The main crops to be included in the rotation will be paddy, surgarcane, wheat and fodders.

7. In the sketch attached as Annexure II the layout of a 1,000 acre farm has been presented. The central strip of 200 acres across the farm has been allotted for buildings and roads, orchards and fuel

wood plantations, etc. The colony will be so plotted that the residential quarters are built up in the centre and are bounded on two sides both by orchards and grazing grounds. Each cottage will have half an acre of land as a frontage for kitchen, gardening, etc. Sanitary wells will also be within easy reach of these quarters. Land for other facilities like hospital, school, market, playground, park, seed store, etc. has also been provided. As for the arable land, four blocks of 200 acres each have been made out. This plan will be common for all the five units except for minor modifications in the case of the State farm in the inhabited locality.

8 Details of the staff and expenditure as required under the co-operative farm, one collective farm and one State farm of one thousand acres each are shown in the pages devoted to each respectively. All the co-operative farms will be formed on the same lines.

9. **General Administration**—Provision for one Director of Farms for 5,000 acres has been made in the staff of the State farms who will be the controlling authority of all the development work. Under him there will be three divisional superintendents, one to be in charge of the State farm, one for the Collective farms and one for three co-operative farms.

10. Provision has also been made for five senior inspectors in Group. I. S. A. S., ten inspectors in Group II, and ten supervisors in Group V for the entire area. Staff has been provided liberally because in the initial stages of this experiment there will be several complications of one kind or another and a great deal depends upon the availability of staff at the right time. The area is very malarious and allowances must be made for replacements and substitutes. Thirdly this staff will gain the necessary experience and some out of its members can be used for further breaking up of areas at a later date when extension of development is undertaken.

11. The expenditure to be incurred both recurring and non-recurring under general administration is given below. This money will be invested by Government in the beginning as it will be too heavy for the co-operative and collective farms. This organization, however, will in point of fact be capable of administering a much larger area. The staff can then he paid for from rent recovered from the land or from the profits of the societies.

Recurring expenditure per annum for the colony :

(*A*) *General Administration*—

—	Pay	Dearness Allowance	Total
	Rs.	Rs.	Rs.
1. Director of Farms Rs.600—1,000	7,200	1,260	8,460
2. Accountant (1) Rs. 140—200	1,680	294	1,974
3. Accounts Clerks (2)	1,440	528	1,968

	Pay	Dearness allowance	Total
	Rs.	Rs.	Rs.
4. Head Clerk (1) Rs.95—5—135	1,140	264	1,404
5. Stenographer (1) Rs.65—5—135	780	264	1,044
6. Assistant Clerks and Typists (3) Rs.50—2—60..	1,800	792	2,592
7. Daftari (1) Rs.25—1—35	300	216	516
8. Peons and orderlies (4) Rs.15—1—25 ..	720	768	1,488
9. Cycle runner (1) 15—½—19	180	192	372
Total ..	..	..	19,418
10. Travelling allowance for staff—lump sum ..	..	..	2,500
11. Office contingencies	..	..	2,000
Total ..	..	..	23,918
(*B*) *Research Administration* :			
1. Research Assistants (4) Rs.80—5—150 ..	3,840	1,056	4,896
2. Orderlies (4) Rs.15—½—25	720	768	1,488
3. Assistant Clerks and Typists (4) Rs.50—2—60..	2,400	1,056	3,456
4. Laboratory Assistants (4) Rs.50—2—60 ..	2,400	1,056	3,456
Total ..	..	..	13,296
5. Travelling allowance for staff—lump sum ..	..	..	2,400
6. Office contingencies	..	..	1,000
Total ..	..	..	16,696

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12. Non-recurring expenditure :

Buildings for office and for the residence of the Director of Farms and the clerical staff .. .. Rs. 35,000

The research staff will be housed on the State farm where due allowances have been made in the estimates.

CO-OPERATIVE FARM

13. The Co-operative Farm and Organization.—The primary society will be the 1,000-acre co-operative farm and each one of these societies will be registered under the Co-operative Act, 1912 of United Provinces. A suitable set of by-laws will be drawn up for each society embracing all the activities of the members. In other words, the Society will be a multi-purpose society financing, helping in production and the marketing of the produce of the individual members.

14. All the primary societies will combine and form themselves into a federation to which they will subordinate themselves. This federation also will be registered under the same Act and will have a suitable set of by-laws.

15. Each society and the federation will be large bodies in time but in the beginning they will need considerable nursing and spoon-feeding by Government. Therefore capable co-operative staff should be appointed in the area to help the members make a good start. Secondly, financial aid will be required and it is suggested that any aid given by Government should be given to the society and in no case to any individual.

16. In the following paragraphs an estimate of expenditure and returns on a single co-operative farm has been given. There are several items here which will involve an advance or a subsidy from Government. These should be made to the society which in turn will pass it on to its members.

17. The Society will have the following sources of income :

(*a*) Interest on loans advanced to members.

(*b*) Hire charges of the common implements.

(*c*) Commission on sale of agricultural produce.

(*d*) Interest on seed advanced to members.

18. These heads should yield an income of Rs.20 to Rs.30,000 from year to year to cover cost of management and payment on borrowings.

19. Estimates of investment and returns on a co-operative farm of 1,000 acres. The farm will accommodate only 80 families :

(*a*) Area under roads, buildings, orchards, etc. .. 200 acres. Each family quarter will be provided with 0·5 acres of land for purposes of kitchen, gardening, poultry, etc.

(*b*) Net area available for cultivation .. .. 800 acres. Each family will be allotted 10 acres of arable land for cultivation.

20. I. The investment by Government as unremunerative recurring and non-recurring expenditure will be as follows :

——		Non-recurring	Recurring
		Rs.	Rs.
(*a*) Initial preparation of land		25,000	..
(*b*) Buildings—			
1. Residential quarters of staff and stores, etc.	Rs. 40,000		
2. Office equipment, etc... ..	3,000		
3. Workshop for light repairs ..	3,000		
4. Miscellaneous expenditure ..	5,000		
Total	51,000	51,000	

	Non-recurring	Recurring
(c) Pay for staff, allowances and contingencies—	Rs.	Rs.
1. D. S. A. at Rs. 200—650. (Since this official will be incharge of all three farms his pay will be debited proportionately to each farm.) Pay Rs. 2,400, D. A. Rs.600	..	3,000
2. Senior Ag. Ins. at Rs. 150—10—220. Pay Rs. 1,800, D. A. Rs.315		2,115
3. Junior Ag. Ins. at Rs. 80—5—150 (2). Pay Rs.1,920, D. A. Rs. 528	..	2,448
4. Agl. Supervisors (2) at Rs. 30—2—40. Pay Rs. 720, D. A. Rs.315	..	1,035
5. Iron smith, Rs. 40—2—60. Pay Rs. 480, D. A. Rs. 264	..	744
6. Clerks and typists (2), Rs. 50—2—60. Pay Rs. 1,200, D. A. Rs. 528	..	1,728
7. Peons and orderlies (6) Rs. 15—1—25. Pay Rs. 1,080 D. A. Rs.1,125	..	2,205
Total	..	10,275
		1,000
Total	76,000	11,275
Office contingencies	..	2,000
Travelling allowance for staff	..	1,000
Total	76,000	14,275

II. **Investment by the Society in the first year will be as follows :**

(*a*) Items on which rent will be recovered from the growers :

——	Non-recurring	Recurring
	Rs.	Rs.
1. Layout of the farms	20,000	..
2. Fencing	24,000	1,200
3. Tube-well	20,000	2,000
Total ..	64,000	3,200
4. Implements	10,800	1,000
Total ..	74,800	4,200

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(*b*) Capital expenditure to be recovered from the growers in easy instalments with interest and fresh advance to be made yearly for replenishing the stock :

——	Non-recurring Rs.	Recurring Rs.
(i) Small tools and implements	16,000	..
(ii) Livestock	1,12,000	..
(iii) Seed and manure	18,750	..
(iv) Cash loans for running expenditure at Rs. 100 per acre	1,00,000	
(*c*) Society paid staff and contingencies, etc.	..	5,000
(*d*) Interest on capital loan of Rs. 2,46,750 to be paid to Provincial Bank at 3 per cent.	..	7,402
Total	2,46,750	16,602

The society will derive revenue as below :

	Rs.
(1) Layout and fencing at Rs. 2-8 per acre	3,000
(2) Tube-well at Rs. 5 per acre on 600 acres	3,750
(3) Implements at Rs. 5 on hire charges	5,000
(4) Interest on Rs. 2,25,000 to be recovered from members at 5 per cent.	11,250
Total	23,000

21. No allowance has been made for tractors, tractor implements, trucks, sheds and workshops in the above figures. It is proposed to have these centralised on the State Farm under an engineer who will be responsible for their maintenance. The engineer will receive a programme of work from the Director of Farms periodically and he will martial his fleet of tractors or trucks, as the case may be, for the programme of work in hand. In this note, therefore, a separate section has been allotted to this item. It can be considered as an investment of the Government over the Co-operative Federation. This investment will be a productive one since all work done for the Society, State, or Collective farms will be chargeable and will be paid for at some fixed rate.

22. The long-term loans will be borrowed from the Provincial Co-operative Bank at 3 per cent. and loaned to the members at 5 per cent. to cover handling charges and establishment, etc. The short-term loan will also be borrowed from the Provincial Co-operative Bank at 5 per cent. and loaned to the members at 5 per cent. In the beginning the Co-operative farms may require all the money mentioned above but in the course of a few years there may be no further need of borrowed capital.

28. The area of holding per family is 10 acres (excluding the pasture lands and orchards) for which the following rotation will be followed :

Rotation I

Plot	First year		Second year		Third year		Fourth year	
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
1. 2 Ac.	Paddy	S. Cane	S. Cane	S. Cane.	Ratoon	Ratoon	G. M.	Wheat.
2. ,,	S. Cane	S. Cane	Ratoon	Ratoon.	G. M.	Wheat	Paddy	S. Cane.
3. ,,	Ratoon	Ratoon (H)	G. M.	Wheat.	Paddy	S. Cane	S. Cane	S. Cane.
4. ,,	G. M.	Wheat	Paddy	S. Cane.	S. Cane	S. Cane	Ratoon	Ratoon.

Abstract in the first year :

Paddy 2 acres, sugarcane 4 acres, wheat 2 acres, green manuring 2 acres.

Rotation II

Plot	First year		Second year	
	Kharif	Rabi	Kharif	Rabi
1. 1 Ac.	Juar or other fodder.	Gram or berseem.	Ley	Ley.
2. ,,	Ley	Ley	Juar or other fodder.	Gram or berseem.

Abstract—Juar 1 acre, gram 1 acre for fodder, ley 1 acre (2 cuts).

From the above rotation it is estimated that each 10-acre plot will yield approximately 900 maunds of green fodder. (*Bhusa* has been converted in terms of green fodder and has been included.) This is sufficient to maintain one pair of bullocks, one cow and one buffalo with calves. If good grazing in available, then one more milch animal may be kept. Secondly, the above rotation can be introduced in the virgin soil but later it will be essential to include *sanai* instead of paddy before cane followed by paddy followed by wheat which will mean slightly reduced yields of paddy and wheat. The maintenance of a cow and a buffalo is going to create an excess production of milk which will have to find a market in some form or the other. If whole milk cannot be exported this milk will have to be processed into *khoa* or *rabri* centrally and then exported in its processed form. This will yield an appreciable side income to the colonist.

24. Each tenant will have annual income from 10 acres cultivated land as below :

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	Acre	Produce				
		Yield	Rate			Amount
		Mds.	Rs.	a.	p.	Rs.
S. Cane	2	1,000	1	4	0	1,250
S. Cane Ratoon	2	800	1	4	0	1,000
Paddy	2	30	10	0	0	300
Wheat	2	30	10	0	0	300
Juar or gram	1	8	5	0	0	40
Berseem (fodder) ..	1	(for cattle feed)				
Total ..						2,890
Milk, orchard, vegetables and gardens on 2 acres						350
						3,240
Deduct expenditure including interest on loan, hire of implements, etc., at Rs. 200 per acre						2,000
						1,240

Estimated net income, Rs. 1,240.

25. The profits from the cultivated area perfamily will, therefore, be Rs.1,240 per annum including the income to be derived from the orchard, vegetables and milch cattle. This shows the scheme to be *self-supporting*.

COLLECTIVE FARMS

26. Collective Farms.—A Collective farm is difficult to define completely because so little is known about such an institution. Below are quoted relevant paragraphs from H. A. Freund's Book "Russia from A to Z."

27. "Kolkhoz" is the universally applied name of the Collective farm as evolved under the scheme of collectivization. Three forms of collectivized farms are enumerated in the Land Code of 1922—the Commune, the Agricultural Artel, the Agricultural Society. While the Commune leaves no room for private ownership nor enterprise of members, including everything, even the dwelling houses in common ownership, the agricultural society on the contrary leaves everything to the members, combining merely the efforts and the implements of the members for common agricultural work. The Artel represents that compromise between these extremes which has been chosen by the Soviet Government as the standard form of Kolkhoz or Collective Farm.

28. The standard articles of association of the Agricultural Artel was approved by the XIth Congress of Kolkhoz Shock workers and was approved by the supreme bodies on February 17, 1925, and these with a few amendments represent the present Kolkhoz structure. The articles declare that the working peasants of a given village voluntarily associate themselves in an agricultural artel "in order by means of the Common possession of the means of productions and the mutual organization of their labour to create a collective or socialized economic unit, to complete the extermination of the Kulaks and all exploiters and enemies of the workers, to banish poverty and ignorance and to dissolve the remnants of small individual enterprise, to raise the productivity of labour and thus to improve the standard of living of the collectivized peasant."

29. The general assembly of the members is the supreme organ. This assembly elects a Managing Committee, for 2 to 5 years and the President of the General Assembly is the *ex officio* Chairman. This Managing Committee is the governing body between meetings of the General Assembly.

30. The association in a Kolkhoz or the joining of an existing Kolkhoz implies the merging "for eternity" of the plots of land of all members into one common field and the surrendering of all agricultural movable properties which are, according to the articles, subject to socialization. To be socialized are all draught animals, agricultural machinery, seeds, fodder in such quantities as is necessary for the feeding of socialized animals, farm buildings necessary for the conducting of the business of the Artel and all industrial enterprises for processing agricultural produce. Not to be socialized but to be left in personal possession are houses, animals and fowls owned individually, farm buildings necessary for sheltering animals left in individual possession; small agricultural tools necessary for the working of individual allotments.

31. In addition to the house, small allotments (vegetable plots, gardens), are to be parcelled out of the common land for the individual use of each Kolkhoz household. The size of this allotment may differ according to regulations based on local conditions. On these allotments each household may have as individual property animals differing in description and number according to districts. Where commercial crops are in the ascendency the number of livestock allowed is low; where stock breeding is the agricultural practice the number of animals permitted to be held per individual is higher.

32. Produce and monetary income (derived from the sale of Kolkhoz products on town markets) are distributed as follows :

(*a*) The gross produce from both arable land and livestock of the Kolkhoz in order of precedence.

(1) Delivery to the state of compulsory quotas, repayment of seed loans and payment in kind to the M. T. S. for work carried out in accordance with the contract between the Kolkhoz and the Motor Tractor Station.

(2) Seed and fodder for cattle for the following year; reserve fund in case of harvest failure.

(3) For subsistence of invalids, aged and temporaril y incapacitated families of serving soldiers, supplying needs of children in creches and orphans. The total amount of means in this fund is not to exceed 2 per cent. of the farm's total produce.

(4) Marketable surplus for sale either to the State or on the open market.

(5) The remainder is to be divided among the members of the Kolkhoz according to the number of their labour days.

(*b*) The monetary income is allocated as follows :

(1) Payment of taxes, insurance premiums, repayment of financial loans.

(2) Expenditure on current productive needs as repairs to equipment and machinery, treatment of livestock, campaigns against pests and vermin.

(3) Administrative costs up to 2 per cent. of the turnover.

(4) Cultural requirements.

(5) Indivisible fund for purchasing equipment and livestock, building material, payment of wages to outside workers for building.

(6) The remainder to the members in accordance with labour days.

33. Members leaving the Kolkhoz have no claim to any of the land of the Kolkhoz.

34. The member of the Kolkhoz is held to devote part of his time to work for the Kolkhoz because all operations are to be performed by the personal labour of the members. Non-members may be hired only if they are specialists (agriculturalists, engineers, technicians, etc.). Only in urgent cases and for building and construction is the employment of outside labour permitted. The member is paid partly in kind and partly in money according to the work performed. The amount of the member's work is computed in labour days.

35. "The Kolkhoz is often described as a co-operative organization of which it undoubtedly has some elements. In contradistinction to the great Soviet Co-operatives which are centralized in huge co-operative bodies the Kolkhozy are not centralized. The autonomy of the Kolkhozy, however, is greatly restricted by government regulations."

36. From the above it becomes clear that the collective farm which is to be tried as an experiment in our scheme will not differ very much in its organization from that of our co-operative farms except inas much as all the means of production and land will be collectivized whereas in the co-operatives each individual will be in possession of his land and his means of production. The second big difference will be in the distribution of the produce. Whereas the co-operative farmer will receive his 10 acre produce for disposal as and how he likes subject to by-laws of the society, the collective farm member will receive only that amount which is in balance along with his labour day emoluments.

37. Because this experiment is being tried on virgin land it is difficult to compare the two systems. If the degree of co-operation is taken far enough there will be no difference except in the manner of disposal of the produce and the monetary returns. The co-operative farmer will borrow from his bank and will repay his borrowings by sale of produce through the marketing facilities offered by the society.

38. As proposed in the beginning of this note the tractor and truck organization for economy and efficiency's sake has been made completely separate. This then will take the place of the M.T.S. of the Soviet and will have to contract for work with the collective farm on a produce basis.

39. In the same way all the initial capital required will have to be put up by the Government in this case against a produce return basis as the collective farm will be a separate autonomous body and will therefore, according to the present Co-operative Act of the United Provinces, not be permitted to have any financial dealings with the Federation or Society bank. The estimated investment is set forth in the paragraph following

Collective farm of 1,000 *acres*

40. It will accommodate 80 families who will work on collective basis on the farm instead of having individual holdings.

(A) Area under roads, buildings, orchards, etc. .. 200 acres.

Each family quarter will be provided with 0·5 acre of land for purposes of kitchen gardening, poultry, etc.

(B) Net area available for cultivation will be 800 acres. The size of the plot will be 40 acres.

Capital expenditure

		Rs.
I.—*Initial cost* :		
41.	(i) For layout, clearance, plotting, kaccha roads, irrigation and drainage channels, levelling, etc.	20,000
	(ii) Barbed wire fencing on R.C. poles with iron gates ..	24,000
	(iii) Initial ploughing with two harrowings	25,000
	Total	69,000
I.—*Non recurring expenditure* :		
1. Bullock implements—		
	McCormic cultivatior (ten at Rs. 100 each)	1,000
	Lever harrows (ten at Rs. 100 each)	1,000
	Victory ploughs (ten at Rs. 700 each)	700
	Turnwest ploughs (ten at Rs. 60 each)	600
	Seed Drills (4 at Rs. 250 each)	1,000
	Reapers (5 at Rs. 200 each)	1,000
	Mowers (4 at Rs. 150 each)	600
	Threshers (5 at Rs. 80 each)	400
	Winnowers (5 at Rs. 400 each)	2,000
	Bullock carts (10 at Rs. 250 each)	2,500
	Desi ploughs (20 at Rs. 10 each)	200
	Praja ploughs (20 at Rs. 21 each)	420
	Chaff-cutters (20 at Rs. 90 each)	1,800
	Patela (20 at Rs. 10 each)	200
	Set of small tools (40 at Rs. 70 each)	2,800
	Total	16,220
2. *Livestock* :		
	(*a*) 40 pairs of bullocks at Rs. 600 per pair	24,000
	(*b*) Milch cattle 80 at Rs. 900 per pair	72,000
	Total	96,000
3. *Buildings* :		
	(1) Accommodation for staff, office, stores, workshop, threshing floors, etc.	40,000
	(*b*) Godown for products	20,000
	(*c*) Cattle sheds and dairying sheds	20,000
	(*d*) Furniture and office equipment	3,000
	(*e*) Miscellaneous expenditure	5,000
	Total	88,000
4. *Irrigation* :		
	Tube-well	20,000

NOTE—All means of production in this case are in common, even the small tools.

III—Recurring expenditure for collective farm per annum—

			Pay	D. A.	Total
			Rs.	Rs.	Rs.
I.	1.	D. S. F., (?) Rs. 200—650 (1)	2,400	600	3,000
	2.	S. A. Insp., Rs. 150—10—220 (1) ..	1,800	315	2,115
	3.	J. Ag. Insp., Rs. 80—5—150 (2) ..	1,920	528	2,448
	4.	Agl. Supervisors, Rs. 30—2—60 (2) ..	720	315	1,035
	5.	Ironsmith, Rs. 40—2—60 (1)	480	264	744
	6.	Clerks and typists, Rs. 50—2—60 (2) ..	1,200	528	1,728
	7.	Peons and orderlies on Rs. 15—1—25 (6)..	1,080	1,125	2,205
		Total ..	..	..	13,275

II.	Travelling allowance for staff	..	1,000
III.	Office contingencies	..	2,000
		Rs.	
IV.	*Seeds and manures—*		
	Wheat 200 mds.	2,000	
	S. Cane 8,000 mds.	12,000	
	Paddy 150 mds.	1,500	
	Sanai 200 mds.	1,000	
	Gram 200 mds.	2,000	
	Juar 25 mds.	250	18,750

N. B.—No, manure will be required for the first two years.

V.	Maintenance of livestock, 160 at Rs. 40 per mensem		78,800

The same remarks apply here in to the co-operative farms regarding the mechanical cultivation. The machines will not belong to the Collective farm although their own men can be trained and be used as tractor drivers for which work they will earn wages.

42. *Abstract of expenditure—*

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		Non-recurring	Recurring
		Rs.	Rs.
1.	Layout	20,000	..
2.	Fencing	24,000	2,000
3.	Initial ploughing	25,000	..
4.	Bullock implements	16,220	1,600
5.	Livestock	96,000	76,800
6.	Buildings	88,000	2,640
7.	Supervision charges	..	16,275
8.	Seed and manures	..	18,750
9.	Irrigation (one tube-well)	20,000	2,750
10.	Tractor charges at 30 per acre	..	30,000
	Total	2,89,220	1,50,815

43. The size of the plots will be 40 acres to facilitate mechanical cultivation. The rotation of crops will be as under for one block of 200 acres:

Rotation I

Plot	First year		Second year	
	Kharif	Rabi	Kharif	Rabi
1. 40 Ac.	Paddy	S. Cane	S. Cane	S. Cane.
2. ,,	S. Cane	S. Cane	Ratoon	Ratoon.
3. ,,	Ratoon	Ratoon	G. M.	Wheat.
4. ,,	G. M.	Wheat	Paddy	S. Cane.

Plot	Third year		Fourth year	
	Kharif	Rabi	Kharif	Rabi
1. 40 Ac.	Ratoon	Ratoon	G. M.	Wheat.
2. ,,	G. M.	Wheat	Paddy	S. Cane.
3. ,,	Paddy	S. Cane	S. Cane.	S. Cane.
4. ,,	S. Cane	S. Cane	Ratoon	Ratoon.

Abstract in the first year for 160 acres:

Paddy 40 acres, sugarcane 80 acres, wheat 40 acres. After *sanai* green manuring, gram will be sown in rabi after paddy.

Rotation II

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Plot size	First year		Second year	
	Kharif	Rabi	Kharif	Rabi
1. 20 Ac.	Juar or other fodder.	Gram or Berseem.	Ley	Ley.
2. 20 Ac.	Ley	Ley	Juar or other fodder.	Gram or Berseem.

Abstract for 40 acres in the first year :

Juar 20 acres followed by gram in rabi. Ley 20 acres. The fodder crops will yield enough for the bullocks and the cattle maintained on the farm.

44. Income as calculated in third year of—

	Rs.
1. Sugarcane 160 acres at 500 maunds at Re. 1-4 = 80,000 mds.	1,00,000
2. Sugarcane ratoon 160 acres at 400 mds. at Re. 1-4 = 64,000 maunds	80,000
3. Wheat 160 acres at 15 maunds at Rs. 10 = 2,400 maunds..	24,000
4. Paddy 160 acres at 15 maunds at Rs. 10 = 2,400 maunds..	24,000
5. Gram and Juar 160 acres at 8 maunds at Rs. 6 = 960 mds.	5,760
Total	2,33,760

45. Abstract of returns on 1,000 acres :

		Rs.
1. 800 acres arable cultivation		2,33,760
2. Milk and milk products		32,400
3. Orchard		2,500
	Total	2,68,660
Deduct interest to be charged against reserve fund and unforeseen losses	13,200	15,000
	1,800	253,660
Deduct recurring expenditure		1,50,815
		1,02,845
Deduct reserve fund 10 per cent.		10,208
Distributable profits Rs. 9 2,637.		92,637

46. The sum of Rs.92,637 has been shown as distributable profits. As a matter of fact this will be the sum available for the payment of work hour units to the members of the Collective Farm. If it is presumed that such family will have put in approximately the same number of work hours then the income per family will be approximately Rs.1,150 per annum.

47. The investment at the Government have been shown in paragraph 42 in abstract. It involves an expenditure of Rs.2,89,220 non recurring and Rs.1,50,815 recurring making a grand total of Rs.4,40.035 Of this amount the recurring expenditure will be paid up each year In addition Government will earn an income of Rs.13,200 as interest on the total sum invested. The Collective Farm will also build-up a reserve of Rs.10,200 per year from which reserve it will be possible to repay the full non-recurring investment of the Government in the course of time if this is found desirable.

STATE FARM

48. State Farm.—The State farm will be essentially a central seed production centre with some portion of it set aside for experimental work. Demonstrations of improved methods and new technique will also be a feature of this farm.

49. In the early stages of the scheme the experimental block will be a necessity to study the various agricultural problems of the area. Besides the field tests of crops, manures and irrigation methods, this block will also be the testing ground for the tractors and tractor implements. The results obtained on this experimental block will not only benefit the co-operative farms situated in the tract under the Development Scheme but will also be of value to the whole of the Tarai tract.

50. Administration.—The Director of Farms will be assisted on the State farm by a Divisional Superintendent of Agriculture, one senior inspector, two junior inspectors. This staff will be responsible for the day to day working on the farm and their emoluments will be a direct charge on the farm.

51. Working Plan.—The work on this State farm will be conducted by hired labour which will consist of some permanent staff and some temporary or seasonal staff. The operations will be done partly by tractor and partly by bullock implements. Here again the tractor will be obtained from the Central Workshop to carry out the necessary operations on payment for work done.

52. This State Farm will produce pedigree seed of approved varieties of all crops and will be responsible for the stocking of all the farms wherever occasions demand. It will also have godowns large enough for the storage of manure and other agricultural commodities to be supplied to the various Co-operative Units or their members when required by them. This organization has been termed the Central Seed Depot.

Estimates of investments and returns on the State Farm of 1,000 *acres.*

53. It will be controlled by Government staff and hired labour. The farm will serve the purpose of a Central Seed Farm, a demonstration centre and an experimental station in the area.

	Acres
54. (A) Area under roads, buildings, M. T. S., centre administrative unit, orchards, etc.	200
(B) Area available for cultivation ..	800

The size of plots will be 40 acres for convenience of tractor and mechanical cultivation.

55. Capital expenditure :

I—*Initial cost* :

	Rs.
(i) For layout, clearance, plotting, kachha roads, Irrigation and drainage channels, levelling, etc.	20,000
(ii) Barbed wire fencing on R. C. poles with iron gates ..	24,000
(iii) Initial ploughing with two harrowings	25,000
Total	69,000

II—*Non-recurring* :

	Rs.	Rs.
1. Livestock :—		
(*a*) 40 pairs of bullocks at Rs. 800 each ..	32,000	51,500
(*b*) Milch animals 20 at Rs. 900 each ..	18,000	
(*c*) Horses for staff 3 at Rs. 500	1,500	
2. Implements same as in collective farms		16,220
3. Buildings :		
(*a*) Cattle sheds and dairy	20,000	75,000
(*b*) Farm sheds and produce stores	25,000	
(*c*) Offices, 4 block offices	20,000	
(*d*) Laboratory	10,000	

	Rs.	Rs.
4. Residential buiildings :		
(a) For D. S. A. and S. A. S., Group I (2) ..	20,000	1,36,000
(b) For block incharges and labour	20,000	
(c) Ministerial staff and labour	50,000	
(d) Chaukidars (4)	4,000	
(e) Inspection or R. House	10,000	
(f) Research assistants 4	32,000	
5. Furniture and other office equipments		5,000
6. Miscellaneous expenditure		5,000
7. Irrigation		20,000
Total Non-recurring		3,08,720

III—Recurring :

I—Farm administration (recurring expenditure per annum for State Farm of 1,000 acres).

——	Pay	D. A.	Total
	Rs.	Rs.	Rs.
1. D. S. A. (1) Rs. 200—650	2,400	600	3,000
2. Senior Ag. Ins. (1) Rs. 150—10—220 ..	1,800	315	2,115
3. J. Ag. Ins. (2) Rs. 80—5—150 ..	1,920	526	2,448
4. Cashier Clerk (1) Rs. 60—3—66—4—90 ..	720	264	984
5. Asstt. clerks and typists (2) Rs. 50—2—60	1,200	528	1,728
6. Peons and orderlies (7) Rs. 15—1—25 ..	1,260	1,344	2,604
7. Agrl. Supervisors (6) Rs. 30—2—40 ..	2,160	1,296	3,456
8. Ironsmith (1) Rs. 40—2—60	480	264	744
9. Chaukidars (4) Rs. 15—½—19	720	768	1,448
10. Cycle runner (1) Rs. 15—½—19	180	192	372
Total	..	..	18,899
11. Travelling for staff L. S.	..	..	1,500
12. Office contingencies L. S.	..	..	1,000
Total ..	..	..	21,399

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II. Seeds :—

	Rs.	
Wheat 200 mds. for	2,000	18,750
Sugarcane 8,000 mds. for	12,000	
Paddy 150 mds. for	1,500	
Sanai 200 mds. for	1,000	
Juar 25 mds. for	250	
Gram 200 mds. for	2,000	

N.B.—Manure will not be needed for the first two years.

III. Maintenance of livestock :—	
Animals 60 at Rs. 40 per mensem	28,000
Horses 3 at Rs. 30 per mensem	1,080
IV. Labour	6,500
V. Irrigation charges at Rs. 15 per acre	12,000

56. *Abstract of expenditure :*

		Non-recurring	Recurring
		Rs.	Rs.
1.	Layout	20,000	..
2.	Fencing	24,000	2,000
3.	Initial ploughing	28,000	..
4.	Implements	16,220	1,600
5.	Livestock	51,500	28,800
6.	Buildings	2,21,000	6,330
7.	Supervision charges	..	21,399
8.	Seeds and manures	..	18,750
9.	Irrigation	20,000	12,000
10.	Tractor charges	..	30,000
11.	Labour charges	..	65,000
	Total	3,77,720	1,85,879

57. Rotation of crops.—The site of the plots will be 40 acres to facilitate mechanical cultivation. The rotation of crops will be as under for one block of 200 acres :

Rotation—I

Plot	First year		Second year	
	Kharif	Rabi	Kharif	Rabi
40 acres	Paddy	S. Cane	S. Cane.	S. Cane.
,,	S. Cane	S. Cane	Ratoon	Ratoon.
,,	Ratoon	Ratoon	G. M.	Wheat.
,,	Fallow	Wheat	Paddy	S. Cane.

Plot	Third year		Fouth year	
	Kharif	Rabi	Kharif	Rabi
40 acres	Ratoon	Ratoon	G. M.	Wheat.
,,	G. M.	Wheat	Paddy	S. Cane.
,,	Paddy	S. Cane.	S. Cane	S. Cane.
,,	S. Cane.	S. Cane	Ratoon	Ratoon.

Abstract in the first year for 160 acres :

Paddy 40 acres, sugarcane 80 acres, wheat 40 acres. After *sanai* green manuring, gram will be sown in rabi after paddy.

Rotation—II

Plot	First year		Second year	
	Kharif	Rabi	Kharif	Rabi
1 .20 acres ..	Juar or other fodder.	Gram or Berseem.	Ley ..	Ley.
2 .20 acres ..	Ley ..	Ley ..	Juar or other fodder.	Gram or Barseem.

Abstract for 40 acres in the first year : juar 20 acres followed by gram in rabi. Ley 20 acres. The fodder crops will yield enough for the bullocks and the milch cattle.

58. Income as calculated in the third year :

		Rs.
1.	Sugarcane planted 160 acres at 600 mds. per acre at 1/4, 96,000 mds.	1,20,000
2.	Sugarcane ratoon 160 acres at 500 mds. per acre at 1/4, 80,000 mds.	1,00,000
3.	Wheat 160 acres at 20 mds. per acre at Rs. 10 per md. 3,200 mds.	32,000
4.	Paddy 160 acres at 20 mds. per acre at Rs. 10 per md. 3,200 mds.	32,000
5.	Gram 160 acres at 10 mds. per acre at Rs. 10 per md. 1,600 Mds	16,000
	Total	3,00,000

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59. Abstract of retruns on 1,000 acres :

		Rs.	
1.	800 acres arable land		3,00,000
2.	Milk and milk products		8,000
	Total		3,08,000
	Deduct interest at 3 per cent. and	16,900	
	unforeseen losses	1,100	
		18,000	18,000
	.. ..		2,90,000
	Deduct recurring expenditure		1,85,879
	Deduct reserve fund		10,400
			93,721

60. The profits on the State Farm have been shown at Rs.93,721 on a total cultivated area of 800 acres, but it has to be mentioned that a considerable area will come out of cultivation on account of the M. T. S. centre and the Seed Store. Moreover, a considerable area will be for experimental purposes. Under the circumstances, the profits may be reduced considerably.

61. The Tractor Centre: *Requirements of the M. T. S. Centre.*—This Scheme comprises an organisation for tractor and allied machinery in order to undertake work on the " custom basis ", i.e. on contract. This may form part of the Federation that will have to be set up for running such large Co-operative farms on remunerative lines.

62. This organisation will cater for the following :

(i) Initial breaking of land with tractors.

(ii) Annual normal ploughings, harrowing and disc-tilling.

(iii) Harvesting and threshing.

It will be seen from the details that such an organisation can work successfully, with proper management, unfettered by any other consideration than that of technical work involved in the different operations.

63. Tractor organisation for a 5,000-acre unit :

Capital expenditure

		No.	Rate	Cost
	1 *Tillage equipment*		Rs.	Rs.
1.	Class III tractor (diesel)	5	18,000	90,000
2.	Class IV tractor (diesel)	2	8,000	16,000
3.	Disc ploughs	3	2,500	7,500
4.	Mould board ploughs	3	2,000	6,000
5.	Sub-soilers, cultivators, ridger and trencher with tool bar.	2	4,000	8,000
6.	Disc harrows	5	2,500	12,500
7.	Disc tillers	5	2,500	12,500
8.	Culti-packers	5	1,000	5,000
9.	Hitches	7	200	1,400
10.	Spares	7	..	10,000
	Total ..	..	..	1,68,900
	2. *Harvesting and threshing equipment*			
11.	Harvester	1	2,000	2,000
12.	Thresher	1	8,000	8,000
13.	Spares	L. S.	..	1,000
	Total ..	..	..	11,000

	No.	Rate	Cost
3. *Transport equipment*			Rs.
14. Motor trucks 3 tons with trailers	2	10,000	20,000
15. Spares	L. S.	..	1,000
Total ..	..	..	21,000
4. *Workshop equipment*			
16. 10 B. H. P. Diesel engine complete ..	1	3,500	3,500
17. Pulleys, belting, shafting, etc.	L. S.	..	2,500
18. 6 screw cutting, sliding and surfacing lathe ..	1	4,000	4,000
19. Drill	1	2,000	2,000
20. Tools and accessories	..	..	6,000
21. Servicing equipment	..	..	2,000
Total ..	..	..	20,000
5. *Stores*			
Engineering Stores	..	..	5,000
6. *Buildings*			
Office Stores and Workshop	..	..	10,000
Machinery shed	..	..	10,000
Tractors and trucks shed	..	..	10,000
Total ..		..	30,000
7. *Residential buildings*			
Tractor Engineer	..	..	10,000
Mechanical Inspector	..	..	5,000
Tractor mechanics and similar supervising staff ..	..	..	25,000
Lower staff	..	..	25,000
Total ..	..	..	65,000

64. Recurring Expenditure :

	Grade	No.	Pay	Dearness allowance
1. Staff—	Rs.		Rs.	Rs.
Tractor Engineer	250—650	1	3,000	600
Foreman Mechanic	150—220	1	1,800	315
Tractor Mechanic	120—150	1	1,440	315
Tractor Operators	80—120	7	6,720	1,848
Tractor Cleaners and Ploughmen ..	30—40	14	5,040	3,696
Truck Operators	80—100	2	1,920	528
Truck Cleaners	30—40	2	720	528
Chaukidars	30—40	5	1,800	1,320
Workshop fitter, turner and black-smith.	80—100	3	2,880	792
Workshop and Store coolies	30—40	8	2,880	2,112
Clerks, Accountants, Correspondence and Stores.	60—90	3	2,160	792
Peons and orderlies	30—40	5	1,800	1,320
..	..	..	32,160	14,166
Total	.. ..	..	..	46,326

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		Rs.	Rs.
2.	Travelling allowance	1,000	1,000
3.	Office contingencies	800	80
4.	Consumable Stores :		
	(i) Diesel and lubricating oils, grease, etc. for tractors	35,000	48,750
	(ii) Petrol for trucks	2,000	
	(iii) Diesel oil for the engine (Rs.1,500 for 2—5,000 acre units and hence ½ debitable here).	750	
	Repairs and replacements	11,000	
5.	Depreciation :		
	(1) Tillage machinery at 20 per cent. on Rs.1,70,000	34,000	39,700
	(2) Harvesting, reaping and workshop machinery at 5 per cent. o Rs.30,000 (half debitable)	750	
	(3) Transport machinery 20 per cent. on Rs.20,000	4,000	
	(4) Buildings at 1 per cent. on Rs.95,000	950	
	(6) Interest at 3 per cent. on Rs.3,20,000		9,600
	Total		1,46,176
			Say Rs.1½ lakhs.

65. Recurring Annual Income :

	Rs.
Ploughing 4,800 acres at Rs.16 per acre	76,800
Harrowing 4,800 acres at Rs.16 per acre	24,000
Disc-tilling 2,400 at Rs.5 per acre	12,000
Trenching 800 acres at Rs.5 per acre	4,000
Threshing 1,600 acres at Rs.10 per acre	16,000
Reaping 1,600 acres at Rs.5 per acre	8,000
Total	1,40,800

66. The 5 class III tractors, to be kept well employed and to keep down the costs, should work for 2,000 hours every year.

Total Tractor-hours 10,000

Initial breaking : At least 6 acres per day of 10 hours per tractor and further ploughing at least 10 acres per day of 10 hours.

Harrowing and disc-tilling—at least 25 acres per day of 10 hours.

Hence after initial breaking, the output in subsequent years will be—

	Acres	Hours
Ploughing	7,000	7,000
Harrowing	7,000	3,000

So these tractors are capable of additional work in a second 5,000 acre unit, with proper management and adequate spare parts for which provision has been made.

67. Harvesting and threshing.—Wheat harvesting and threshing—800 acres.

Paddy harvesting and threshing—800 acres capacity of thresher—75 maunds per hours, i.e. 5 acres per hours of wheat or rice.

For threshing 1,600 acres, the thresher will take 320 hours, i.e. just over a month.

One thresher can, therefore, control 2-5,000 acre units.

Capacity of reaper is 3 to 4 acres per hour. It should also be able to control 2-5,000- acre units.

68. **Summary.**— In the opening Chapter the general lines of Development have been discussed. The main feature of the programme is that the farming in the area will be on Co-operative lines. To what extent the co-operative effort will go depends upon the members themselves under the guidance of the Co-operative Officer. In addition there is provision for one State and one Collective farm.

69. The second main feature is the working of. the farms by mechanical and bullock power. It was originally felt that each farm should have its own tractor and implements but on examination this was found to have two major drawbacks. In the first place `each farm owning their own tractors would involve the Society in a considerable monetary outlay and the possession of excessive power. Secondly, maintenance would be defective unless centralized. Hence it was decided to centralize the tractors on what has been termed the M.T.S. or the Machine Tractor Station. The work done by the Station for any of the farms will be paid for by the farm which engages its machines.

70. The Plan of the Layout leaves room for dwelling houses and open spaces for an orchard, grazing, and for buildings of common use such as a dispensary, school, village hall, etc., etc. Moreover, half an acre has been attached to each household for the keeping of a kitchen garden or small live-stock such as poultry, goats or pigs. The effect of this will be that besides the income to be received from the agricultural produce of the arable land an income can be earned from subsidiaries.

71. **Staff.**—Provision has been made for a large administrative staff. This staff is necessary for the general working of all the farms for the effective control of the State farm and for the disposal of general administrative matters pertaining to the agricultural policy of the farms. Another important role of this Administration unit is that of future planning. Before any expansion takes place in the scheme it is essential that a proper working plan should be drawn up and examined in advance because the rotation of crops for the first 5,000 acres may not be the same for subsequent areas taken up under the scheme.

72. **Research.**—Provision has been made for the maintenance of some agricultural research workers. This has been done because of the difficult problems which are to be faced in the tract. No accurate information is available of the incidence of insect pests and fungoid diseases; the chemical, physical and bacteriological properties of the soil; the possibilities of better and improved varieties of crops. In the past, there has been hardly any population and no farming on systematic lines in the area.

73. **Supervisory Staff.**—It will be noticed that each farm has been staffed with a full complement of Agricultural workers. This may seem excessive but has been found necessary as in the first stages of the work many difficulties are anticipated. Later, it may be possible to handle larger areas with a smaller complement of staff.

74. **The Co-operative Farm.**—A brief account has been given of the structure of the societies and the details of their budget positions have been given. This shows that the State will invest a non-

recurring sum of Rs.76,000 and an annual recurring sum of Rs.14,275 per farm. In addition, each Co-operative farm will require money to invest and also to give out on loan to members. Under the head investment each Society will require Rs.74,800 non-recurring and Rs.4,200 recurring; under the head loans to members and miscellaneous charges each Society will require Rs.2,46,750 non-recurring and Rs.12,402 as recurring charges.

75. **The Collective Farm.**—The introductory paragraphs give a short account of the evolution and make up of the Kolkhoz of the Russian type. The details of expenditure and returns have been made up with these features in view. In this case the Government will invest Rs.4,40,035 per farm (non-recurring Rs.2,89,220 and recurring Rs. 1,50,815) and will obtain an approximate amount of Rs.1,65,815. on the investment.

76. **The State Farm.**—The make-up of this farm will be the same as any state farm in existence to-day. It will be a pedigree seed producing farm primarily and will have part of the area set aside for research and demonstration. On this farm will be located the "Motor tractor Stations", the General Administrative block and Central Seed Store. Complete details have been given in the main body of the report.

77. A general feature of the rotation is the introduction of sufficient fodder for the maintenance of draught and milch animals. The main idea is the introduction of "Ley" farming. At the present time there is scant knowledge about the possibilities of good grasses for this type of farming and until such time as need of such grasses is available the area to be put under the "Ley" farming system will be under such grasses and clovers as Berseem, Guinea or Napier grass along with Juar and Oats.

78. The two annexures give a plan of the layout of a single farm and the anticipated expenditure and investment involved.

The statement shows that the Government will have to invest approximately Rs.18,30,000 on 5,000 acres. Of this sum approximately Rs.12,60,000 will be non-recurring and Rs.5,70,000 will be recurring. In addition each co-operative farm will have to borrow approximately Rs.3,21,550 to cover loans, advances and working expenses. This loan can be raised either from the Government as an interest free *taqvi* loan or from the Provincial Co-operative Bank.

2. The buildings involving a non-recurring expenditure of Rs.6,02,000 will be earning rent. The expenditure under staff is heavy but this in due course will be reduced when the difficulties of the initial stages have been overcome. The sum of Rs.1,25,000 against initial ploughing can be considered as a non-recoverable investment.

3. Implements, live-stock and cost of production figures are shown as recurring expenditure only in the case of the Collective and State Farms. Since these farms will also be paying a revenue, it is expected that the return will justify the expenditure under these heads.

4. The items under tractor implements, harvesting and threshing machinery, transport, workshop, consumable stores, and depreciation in column " M. T. S." centre, are investments which will yield returns as shown in the paragraph on "Tractor Organization."

ANNEXURE I

Statement showing estimated expenditure to be incurred by Government

1	2	3		4		5		6		7		8		9			10		
Serial no.	Items	General Administration		Collective Farms (1,000 Ac.)		State Farm (1,000 Ac.)		Central Seed Store		M. T. S. Centre		Total		Co-operative Farms (3)			Grand Total		
		Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	Loans	Non-recurring	Recurring	Loans
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Building	35,000	..	88,000	2,640	2,21,000	6,330	10,000	..	95,000	..	4,49,000	8,970	1,53,000	..	..	6,02,000	8,970	..
2	Staff, Travelling Allowance and Contingencies.	..	40,000	..	16,275	..	21,399	..	3,832	..	48,200	..	1,29,706	..	42,725	..	..	1,72,431	..
3	Initial ploughing ..	..	..	25,000	..	25,000	..	..	..	..	..	50,000	..	75,000	..	..	1,25,000	..	..
4	Layout and fencing ..	..	..	44,000	2,000	44,000	2,000	..	..	..	..	88,000	4,000	..	..	1,32,000	88,000	4,000	1,32,000
5	Implements	..	..	16,220	1,600	16,220	1,600	..	..	..	..	32,440	3,200	..	..	80,400	32,440	3,200	80,400
6	Livestock ..	..	..	96,000	76,800	51,500	28,800	..	..	..	..	1,47,500	1,05,600	..	..	3,36,000	1,47,500	1,05,600	3,36,000
7	Cost of production ..	..	..	20,000	51,500	20,000	1,25,750	..	..	..	..	40,000	1,77,250	..	..	4,16,250	40,000	1,77,250	4,16,250
8	Tractor implements ..	..	..	..	..	..	..	..	..	1,68,900	..	1,68,900	..	..	..	..	1,68,900	..	..
9	Harvesting ..	..	..	..	..	..	..	..	..	11,000	..	11,000	..	..	..	..	11,000	..	..
10	Transport	..	..	..	..	..	..	..	..	21,000	..	21,000	..	..	..	..	21,000	..	..
11	Workshop stores ..	..	..	..	..	..	..	..	..	25,000	..	25,000	..	..	..	..	25,000	..	..
12	Consumable goods ..	..	..	..	..	..	..	..	..	..	49,000	..	49,000	..	..	..	..	49,000	..
13	Depreciation interest ..	..	..	..	..	..	..	..	..	..	49,000	..	49,000	..	..	..	..	49,000	..
	Total ..	35,000	40,000	2,89,220	1,50,815	3,77,720	1,85,879	10,000	3,832	3,20,900	1,46,200	10,32,840	5,26,726	2,28,000	42,725	9,64,650	12,60,840	5,69,451	9,64,650

NOTES—Columns 3 to 7 show estimates for units which will not be duplicated in the first 50,000 acres and hence totals given separately.

Column 9 shows estimates for three Co-operative Units only of which several are expected to be developed in due course.

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APPENDIX X

Estimate of expenditure for establishing a cattle breeding farm in the Colonization area in Naini Tal Tarai with a herd of 100 *cattle*

		Rs.
Recurring	.. ..	88,100
Non-recurring	.. ..	2,12,700
	Total ..	3,00,000

Items		Cost of start	
	Recurring	Non-recurring	Ultimate cost
1	2	3	4
I. Pay of establishment—	Rs.	Rs.	Rs.
1 Farm Superintendent (Veterinary Inspector) Rs.150—10—220	1,800	..	2,640
1 Dairy Assistant Rs.80—5—150	960	..	1,800
1 Farm Assistant (Cultivation) Rs.80—5—150	960	..	1,800
1 Farm Clerk Rs.50—2—60	600	..	720
1 Stockman (Veterinary) Rs.30—1—35—1—40	360	..	480
1 Godown Keeper Rs.30—1½—48	360	..	576
4 Jamadars (Dairy, Cultivation, Cattle and Grazing) Rs.20—½—25	960	..	1,200
Total ..	6,000	..	9,216
II. Allowances—			
Dearness Allowance	2,100		
Total ..	..	..	2,100
III. Contingencies—			
Miscellaneous cost of feeds and fodder, chemicals and apparatus, labour charges, etc.	80,000	..	80,000
Machinery and Tube-well—One tube-well with 6″ boring including Ruston Engine 20 H.P. and pumping plant set and irrigation channels—Rs.15,000 and two power chaffcutters at Rs.1,500 each ..	..	18,000	..
Dairy equipment ;			
Agricultural Implements	..	21,700	..
Livestock	..	6,500	..
100 buffaloes at Rs.300 each, 8 buffalo-bulls at Rs.500 each, 10 pairs of bullocks at Rs.600 per pair, 1 horse for Rs.500	..	40,500	..
IV—Capital expenditure on buildings	..	1,26,000	..
Total ..	80,000	2,12,700	80,000
GRAND TOTAL (Totals of I, II & III)	88,100	2,12,700	91,316

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List of Dairy buildings

		Rs.
1.	Milking Byre—to accommodate 64 buffaloes (to be located in such a way as to be capable of expansion)	20,000
2.	Milk recording room	2,000
3.	Dairy building with office, small laboratory, cold storage, washing and machinery rooms	10,000
4.	Dry cattle sheds for 40 buffaloes	6,000
5.	Calving sheds to accommodate 4 buffaloes at a time with a room for the attendants in each	4,000
6.	Suckling calves shed with enclosures and run	2,000
7.	Heifers shed with enclosure divided into 2 blocks. For 1 to 2 years and 2 to 3 years age	4,000
8.	Buffalo-bull calves shed with enclosure for 1 to 2 years age ..	2,000
9.	Segregation ward with medicine room	4,000
10.	Bullock shed for 20 heads	2,000
11.	Concentrates and bhusa godown with mixing room, along with a chaff cutting shed	5,000
12.	Implements and cart shed combined	1,000
13.	Foot baths with enclosure	2,000
14.	Four water troughs in the open	4,000
15.	Bathing tank for buffaloes	2,000
16.	Buffalo-bull stalls with enclosure and run for 4 bulls	8,000
17.	Stock and Sile pit yard (100′ × 150′), two Dutch Barns and enclosure with 3 gates and 4 ft. high wire fence	5,000
18.	Service crutch or trevis for securing cattle for dressing or inoculation or insemination	1,000
19.	Standard residential buildings for officers—	
	(*a*) One quarter for farm Superintendent	8,000
	(*b*) One quarter for Dairy Assistant	5,000
	(*c*) One quarter for Farm Assistant .. .. .. One quarter for clerk .. .. One quarter for stockman .. .. One quarter for Godown Keeper	12,000
	(*d*) Four quarters for Jamadars	4,000
	(*e*) Four blocks of cooly quarters providing family accommodation ..	8,000
	(*f*) Farm Office (2 rooms)	5,000
	Total ..	1,26,000

Balance sheet

Income		Rs.	Expenditure		Rs.
1.	Income from sale of milk assuming that 2/3rd of 10 buffaloes, i.e. 60 buffaloes will be in milk all through the year and each buffalo will yield 16 lbs. of milk per day (Sale rate—4 seers for a rupee : 60 × 8 × 365/4)	43,800	1.	Pay and dearness allowance	8,100
2.	Income from sale of male calves on an average production of 30 such calves a year and their sale after 9 months of age at Rs.10 p.m.: 30 × 10 × 9	2,700	2.	Contingencies–Miscellaneous cost of feeds and fodder, chemicals and apparatus, labour charges, etc. ..	80,000
3.	Value of 20 female calves produced each year as per above calculation in case of male calves ..	2,400	3.	Non-recurring expenses at 10 per cent. of Rs.2,12,700	21,270
4.	Estimated cost of animal production of fodder at the farm	50,000		Total ..	1,09,370
				Deficit ..	10,470
	Total ..	98,900		Total ..	98,900

APPENDIX XI

Naini Tal Tarai Colonization Scheme

ESTIMATES OF EXPENDITURE

I—Non-repayable Expenditure

Serial no.	Particulars	Details	Amount	
			Non-recurring	Recurring
	2	3	4	5
			Rs.	Rs.
1	Roads	(1) Main 30 miles at Rs. 40,000 per mile.	12,00,000	12,000
		(2) Branch, 50 miles at Rs.5,000 per mile.	2,50,000	2,500
		(3) Tarai 4 miles at Rs.20,000 per mile.	80,000	800
2	Irrigation	(1) 40 Tube-wells with irrigation channels at Rs.20,000 each.	8,00,000	2,000
		(2) Canals improvement ..	50,000	
3	Drinking Water	20 Tube or Artisan wells at Rs.10,000 each.	2,00,000	20,000
4	Drainage Works	(1) General, 40 miles at Rs.5,000 per mile.	2,00,000	10,000
		(2) Town and Village 12½ miles at Rs.8,000 per mile.	1,00,000	5,000
5	Fencing	30 miles at Rs.5,500 per mile.	1,65,000	1,000
6	Anti-malaria measures		8,16,000	4,08,000
7	Veterinary Hospital	..	25,000	5,000
8	Development of land	(i) Clearance at Rs.20 per acre	10,00,000	1,00,000
		(ii) Layout of Farms ..	1,75,000	
9	Tractor	30 outfits at Rs.25,000 each	7,50,000	
10	Tractor Workshop	..	1,00,000	10,000
11	Management	(i) Administrative ..	..	40,000
		(ii) Agricultural ..		40,000
12	Estate buildings	..	2,00,000	10,000
13	Transport	12 Trucks at Rs.10,000 each	1,20,000	18,000
14	Temporary Hutments		50,000	
		Total, Non-repayable expenditure ..	62,81,000	6,84,300

APPENDIX XI

Naini Tal Tarai Colonization Scheme

ESTIMATES OF EXPENDITURE

II.—Repayable Expenditure

Serial no.	Particulars	Details	Amount Non-recurring	Amount Recurring
			Rs.	Rs.
1	Cattle Breeding Farm	Herd of 100 cattle ..	2,13,000	88,000
2	State Farm	.. .. ..	3,77,700	1,85,900
3	Collective Farm	.. .. ..	2,89,200	1,50,800
4	Co-operative Farm	.. .. ..	..	43,000
5	Settlers Houses	3,500 at Rs. 2,500* each ..	87,50,000	..
	Total, Repayable expenditure	..	96,29,900	4,67,700
	Grand Total	..	1,59,10,900	11,52,000

Abstract of expenditure

		Rs.	Rs.
1	Non-repayable	62,81,000	6,84,300
2	Repayable	96,29,900	4,67,700
	Total ..	1,59,10,900	11,52,000

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*Recoverable in forty half-yearly equated instalments of Rs.84·1 with interest at 3 per cent. per annum.

सत्यमेव जयते

APPENDIX XII

Kashipur Colonization Scheme

ESTIMATES OF EXPENDITURE

I—Non-repayable Expenditure

Serial no.	Particulars	Details	Amount Non-recurring	 Recurring
			Rs.	Rs.
1	Cost of Acquisition ..	..	1,67,000	..
2	Roads	(i) Main 10 miles at Rs. 40,000 per mile ..	4,00,000	4,000
		(ii) Branch 24 miles at Rs. 5,000 per mile ..	1,20,000	1,200
3	Irrigation ..	25 Tube-wells with channels at Rs. 20,000 each ..	5,00,000	1,000
		Canal improvement 30 miles at Rs. 2,000 per mile	60,000	6,000
4	Drinking Water ..	10 Tube or Artisan wells at Rs. 10,000 each ..	1,00,000	10,000
5	Drainage Works ..	(i) General 15 miles at Rs. 5,000 per mile ..	75,000	3,750
		(ii) 8 causeways at Rs. 6,000 each ..	48,000	2,400
		(iii) Town and village drains 5 miles at Rs. 8,000 per mile ..	40,000	2,000
6	Fencing	14 miles at Rs. 5,500 per mile	77,000	700
7	Anti-malaria measures	..	5,71,000	2,86,000
8	Veterinary Hospital..	..	25,000	5,000
9	Development of Land	(i) Clearance at Rs. 20 per acre	7,00,000	..
		(ii) Layout of Farms ..	1,22,500	..
10	Tractors ..	12 outfits at Rs. 25,000 each, 1/3 cost debited to Colony ..	1,00,000	..
11	Tractors Workshops..	..	1,00,000	10,000
12	Management ..	(i) Administrative ..	..	30,000
		(ii) Agriculture ..	..	40,000
13	Estate Buildings ..	..	1,40,000	9,000
14	Transport ..	6 Trucks at Rs. 10,000 each with garages at Rs. 200 each	61,200	8,750
15	Temporary Hutments	..	35,000	..
		Total, Non-repayable Expenditure ..	34,41,700	4,19,800

सत्यमेव जयते

Kashipur Colonization Scheme

ESTIMATES OF EXPENDITURE

II—Repayable expenditure

Serial no.	Particulars	Details	Amount Non-recurring	 Recurring
			Rs.	Rs.
1	Cattle Breeding Farm	Herd of 100 cattle ..	2,13,000	88,000
2	State Farm ..	..	3,77,700	1,85,900
3	Collective Farm ..	..	2,89,200	1,50,800
4	Co-operative Farm ..	..	..	25,900
5	Settlers Houses ..	2,000 at Rs. 2,500* each ..	50,00,000	..
	Total, Repayable Expenditure	..	58,79,900	4,50,600
	Grand Total	..	93,21,600	8,70,400

Abstract of Expenditure

			Rs.	Rs.
1	Non-repayable ..	..	34,41,700	4,19,800
2	Payable ..	..	58,79,900	4,50,600
		Total ..	93,21,600	8,70,400

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*Recoverable in forty half-yearly equated instalments of Rs.84-1 with interest at 3 per cent. per annum.

North Afzalgarh Colonization Scheme

ESTIMATES OF EXPENDITURE

I—Non-repayable expenditure

Serial no.	Particulars	Details	Amount	
			Non-recurring	Recurring
			Rs.	Rs.
1	Cost of Acquisition ..	..	1,53,000	..
2	Roads	(i) Main 10 miles at Rs.40,000 per mile ..	4,00,000	4,000
		(ii) Branch 24 miles at Rs.5,000 per mile ..	1,20,000	1,000
3	Irrigation ..	Canal Headworks and Channels ..	1,00,000	1,000
4	Drinking Water ..	6 tube-wells at Rs.10,000 each ..	60,000	6,000
5	Drainage Works ..	(i) General 10 miles at Rs.5,000 per mile ..	50,000	2,500
		(ii) 6 Causeways at Rs.6,000 each ..	36,000	1,800
		(iii) Town and Village drains 5 miles at Rs.8,000 per mile	40,000	2,000
6	Fencing	10 miles at Rs.5,500 per mile	55,000	550
7	Anti-Malaria measures	..	4,08,000	2,04,000
8	Veterinary Hospital ..	..	25,000	5,000
9	Development of Land	(i) Clearance at Rs.20 per acre,	5,00,000	25,000
		(ii) Layout of Farms ..	87,000	..
10	Tractors	9 outfits at Rs.25,000 each 1/3 cost debited to colony.	75,000	..
11	Tractor Workshop ..	..	1,00,000	10,000
12	Management ..	(a) Administrative ..	..	20,000
		(b) Agricultural ..	..	40,000
13	Estate Buildings ..	..	1,00,000	5,000
14	Transport ..	6 Trucks at Rs.10,000 each with 6 garages at Rs.200 each	61,200	8,950
15	Temporary Hutments	..	25,000	..
		Total, Non-repayable expenditure ..	23,95,200	3,36,800

सत्यमेव जयते

North Afzalgarh Colonization Scheme

ESTIMATES OF EXPENDITURE

II—Repayable expenditure

Serial no.	Particulars	Details	Amounts Non-recurring	Amounts Recurring
			Rs.	Rs.
1	Cattle Breeding Farm	Herd of 100 cattle ..	2,13,000	88,000
2	State Farm ..	..	3,77,700	1,85,900
3	Collective Farm ..	..	2,89,200	1,50,800
4	Co-operative Farm ..	..	..	18,500
5	Settlers Houses ..	1,400 at Rs.2,500 each* ..	35,00,000	..
	Total, Repayable expenditure	..	43,79,900	4,43,200
	GRAND TOTAL ..	..	67,75,100	7,80,000

Abstract of Expenditure

			Rs.	Rs.
1	Non-repayable ..	..	23,95,200	3,36,800
2	Repayable ..	..	43,79,900	4,43,200
		Total ..	67,75,100	7,80,000

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*Recoverable in forty half-yearly equated instalments of Rs.84-1 with interest at 3 per cent. per annum.

ESTIMATE FOR THE LAKHIMPUR-KHERI COLONIZATION SCHEME

Non-Repayable

Serial no.	Particulars	Details	Amount	
			Non-recurring	Recurring
			Rs.	Rs.
1	Cost of Acquisition ..	..	38,500	..
	Roads	Main 4 miles at Rs.30,000	1,20,000	..
		Branch 4 miles at Rs.5,000	20,000	3,200
2	Irrigation ..	(1) Tube-wells ..	47,000	4,700
		(2) Canals	..	..
3	Drinking water ..	..	20,000	200
4	Health and Anti-malaria measures.	..	.. ..	Part of General Scheme.
5	Development of land	(1) Clearance	13,000	..
		(2) Layout of farms ..	18,000	..
6	Tractors ..	..	..	Part of General Scheme.
7	Tractor Workshop ..	..	..	Ditto.
8	Management ..	(a) Administrative ..	..	16,800
		(b) Agriculture ..	..	10,000
9	Estate Buildings ..	..	20,000	2,000
10	Temporary Hutments	..	10,000	..
		Total ..	3,06,500	36,900
		Repayable		
1	Settler's Houses 300 at Rs.2,500* each.	..	7,50,000	..
		Total ..	7,50,000	..
		GRAND TOTAL ..	10,56,500	36,900

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*Recoverable in half-yearly equated instalments of Rs.84·1 with interest at 3 er cent. per annum.

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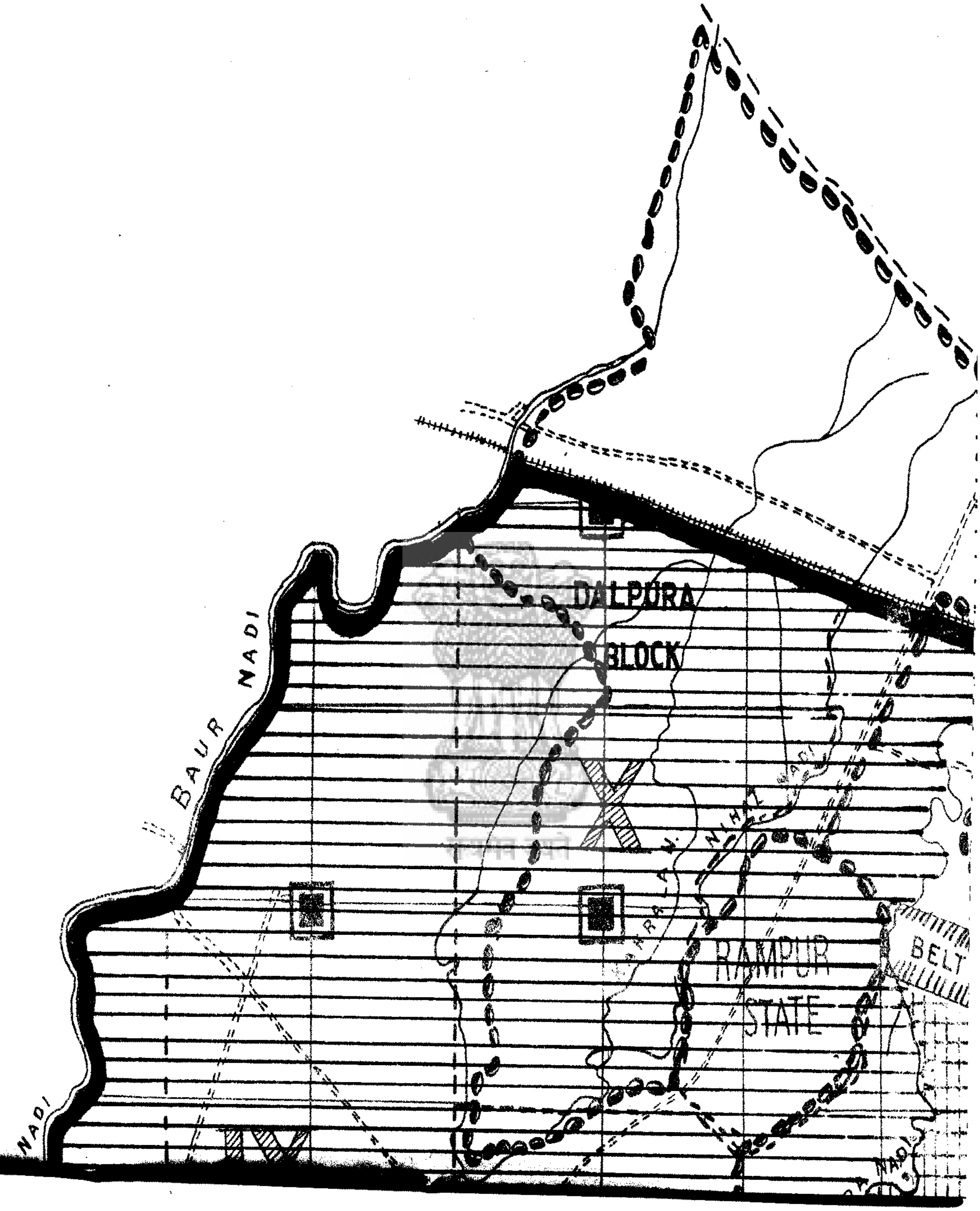
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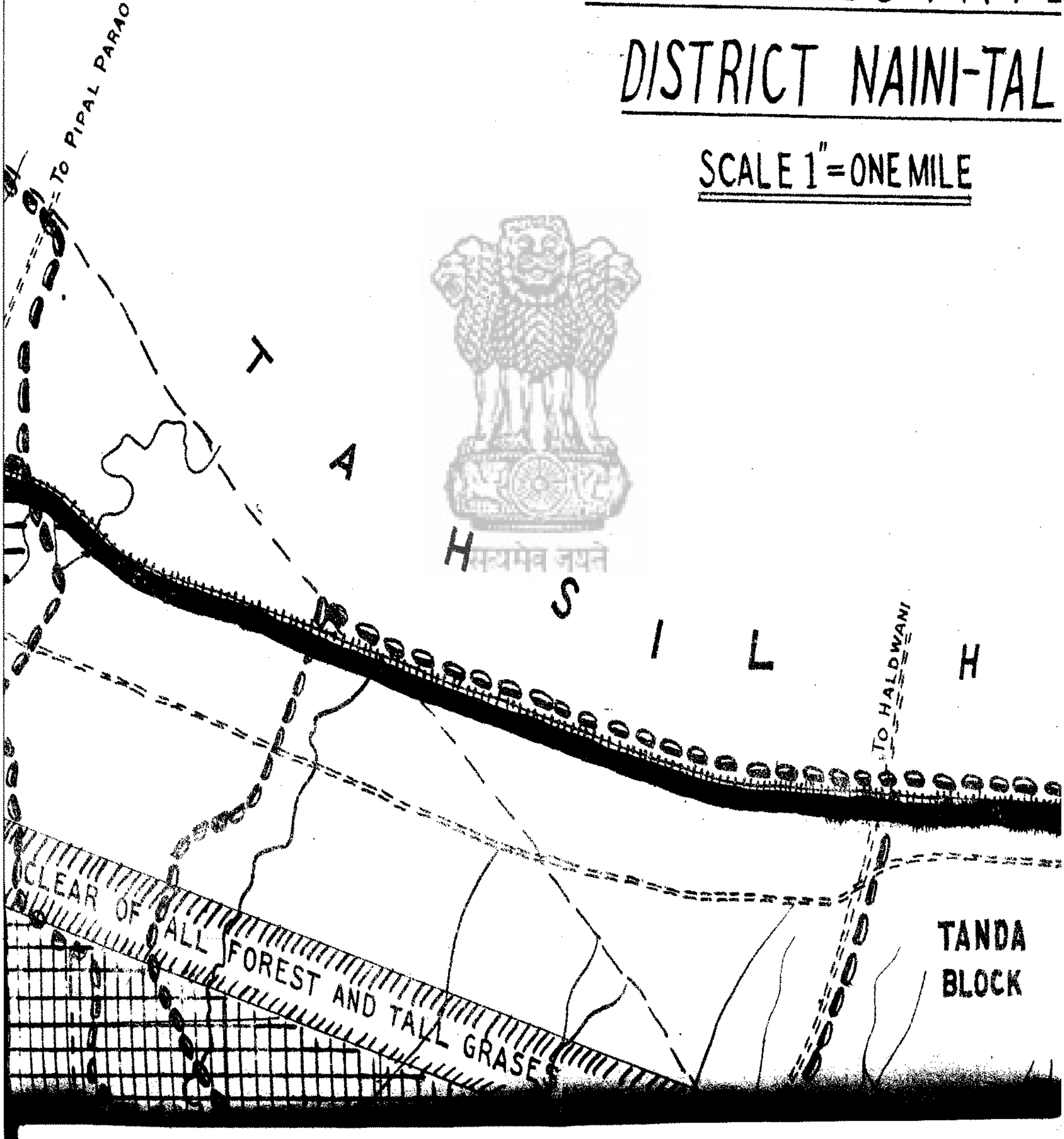
APPENDIX A

PLAN OF "EX-SERVICE MEN'S" IN T.B. ESTATE DISTRICT NAINI-TAL

SCALE 1" = ONE MILE



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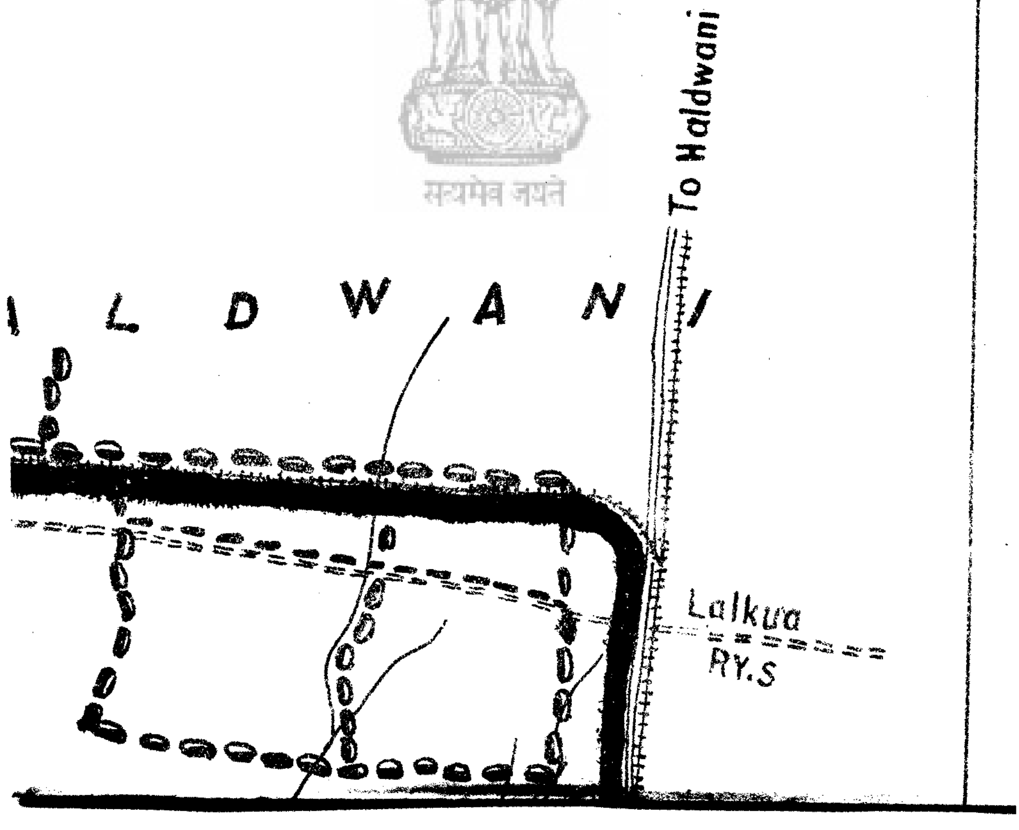

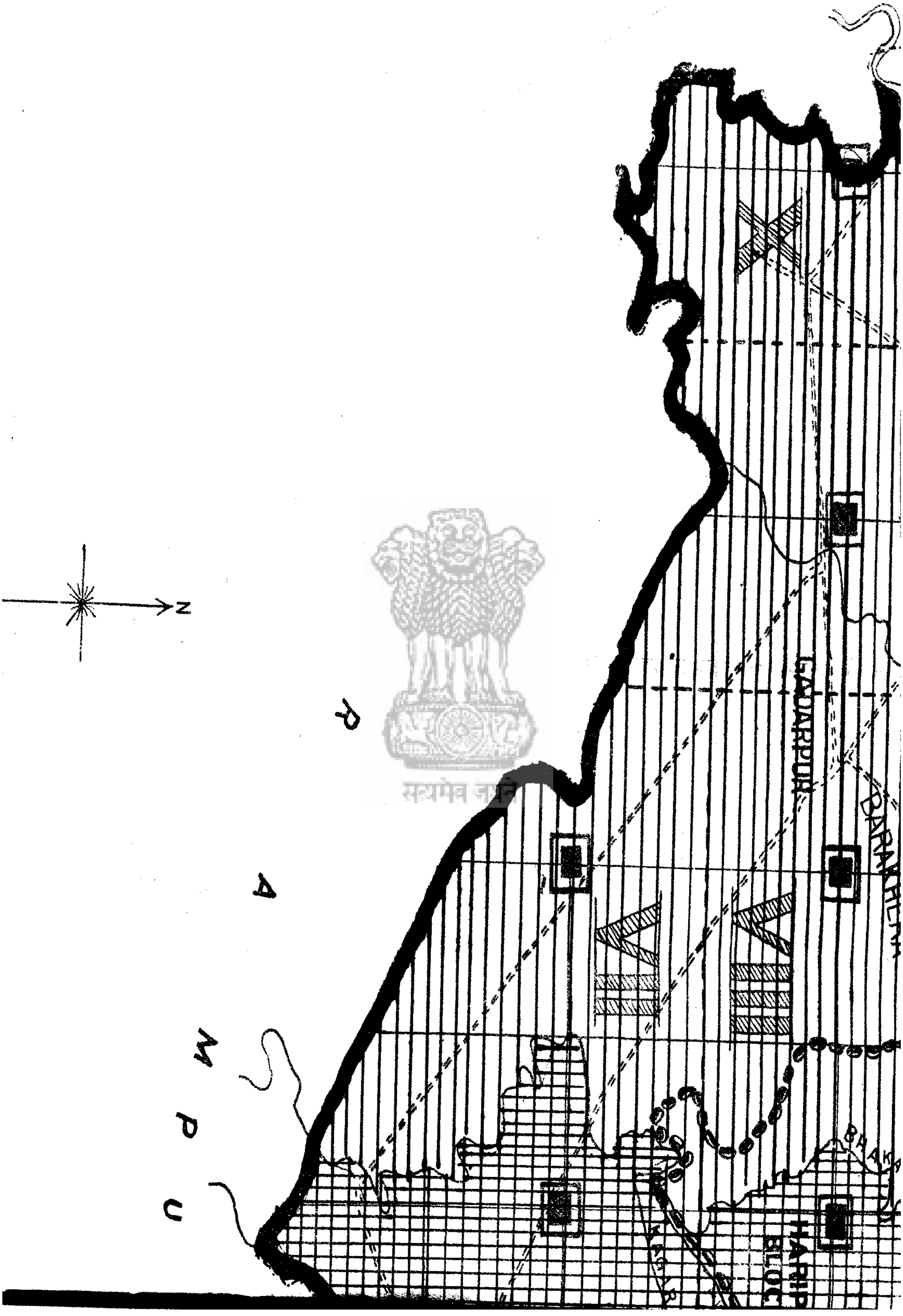

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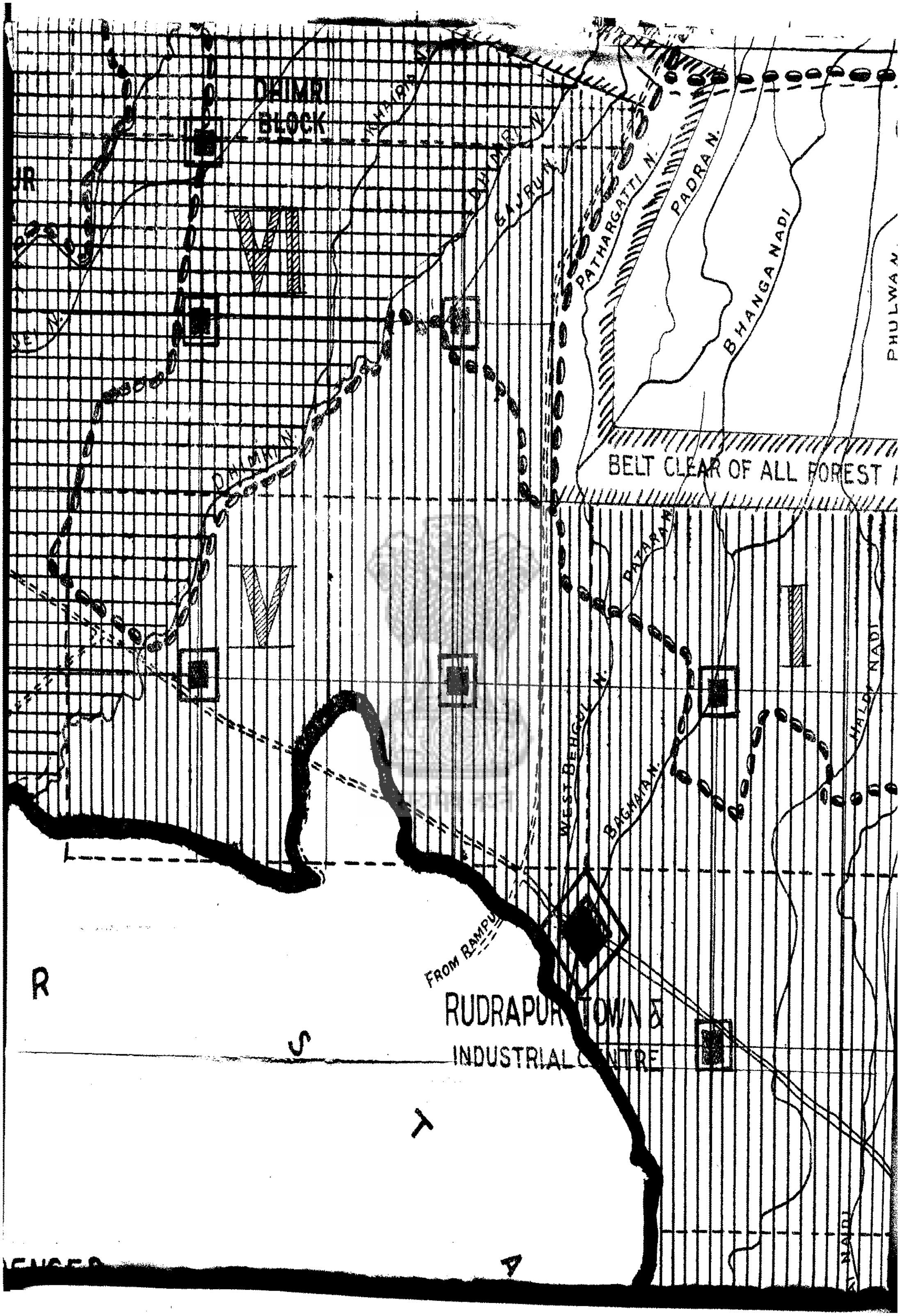

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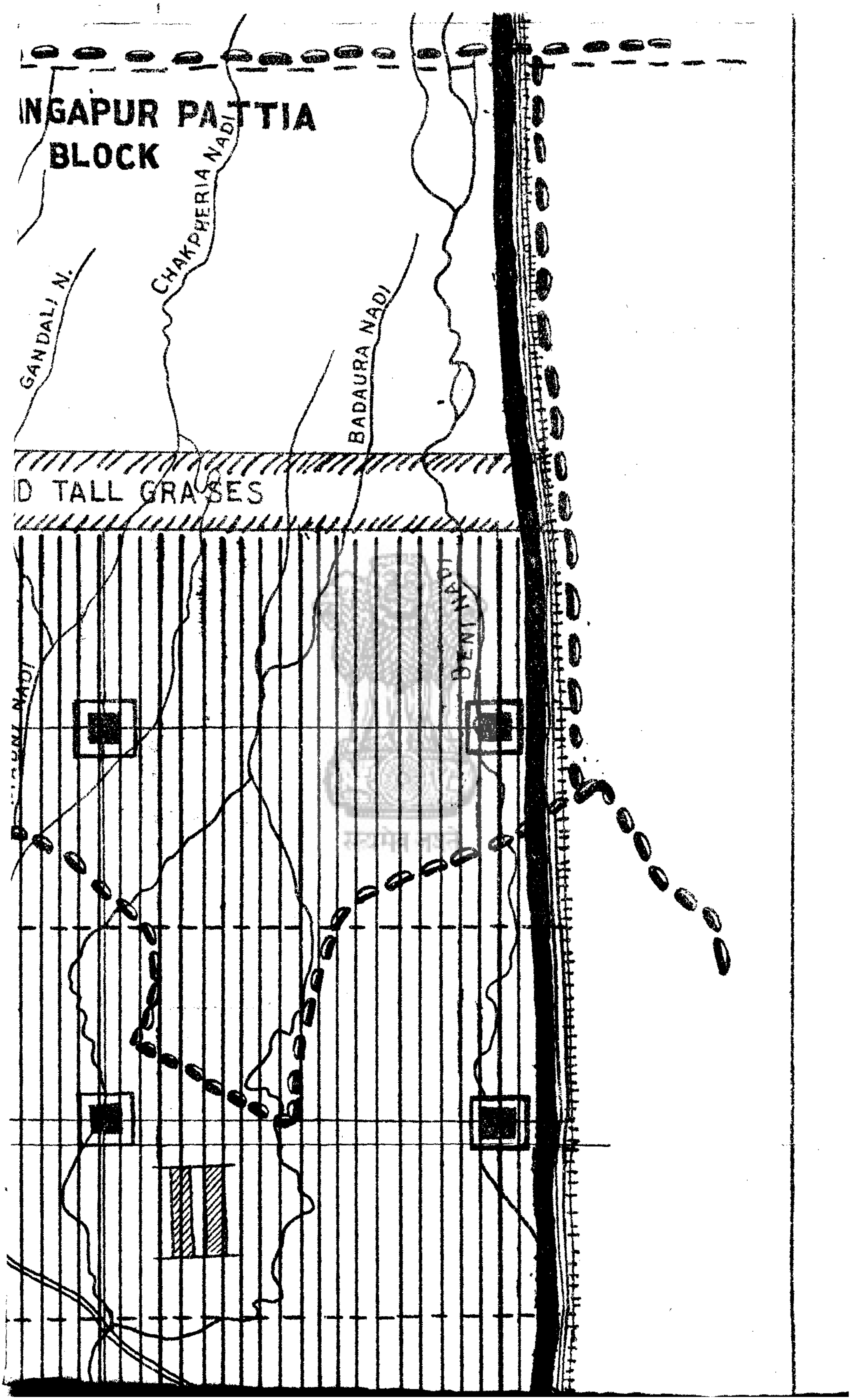
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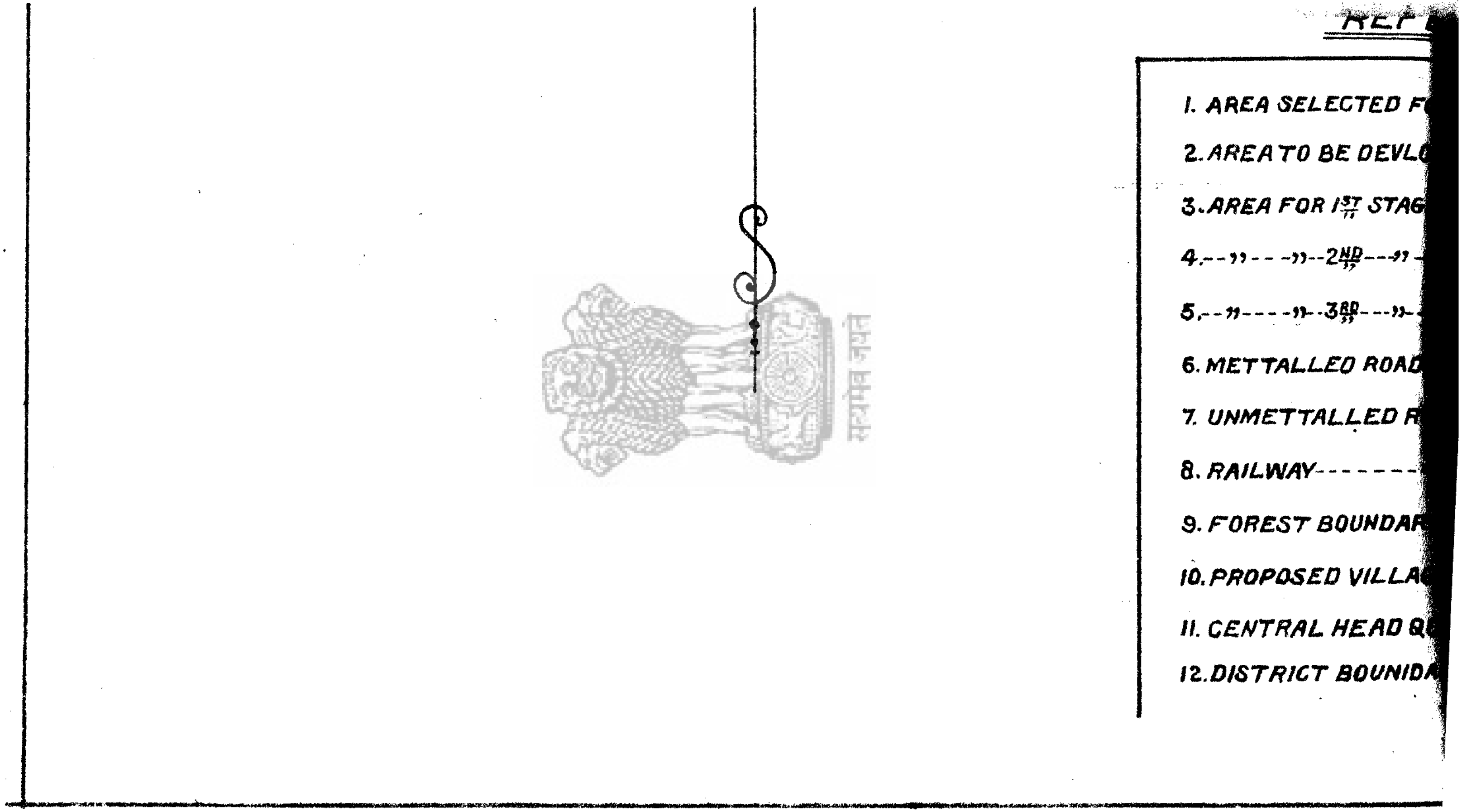
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7. UNMETTALLED
8. RAILWAY--------
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10. PROPOSED VILLA
11. CENTRAL HEAD Q
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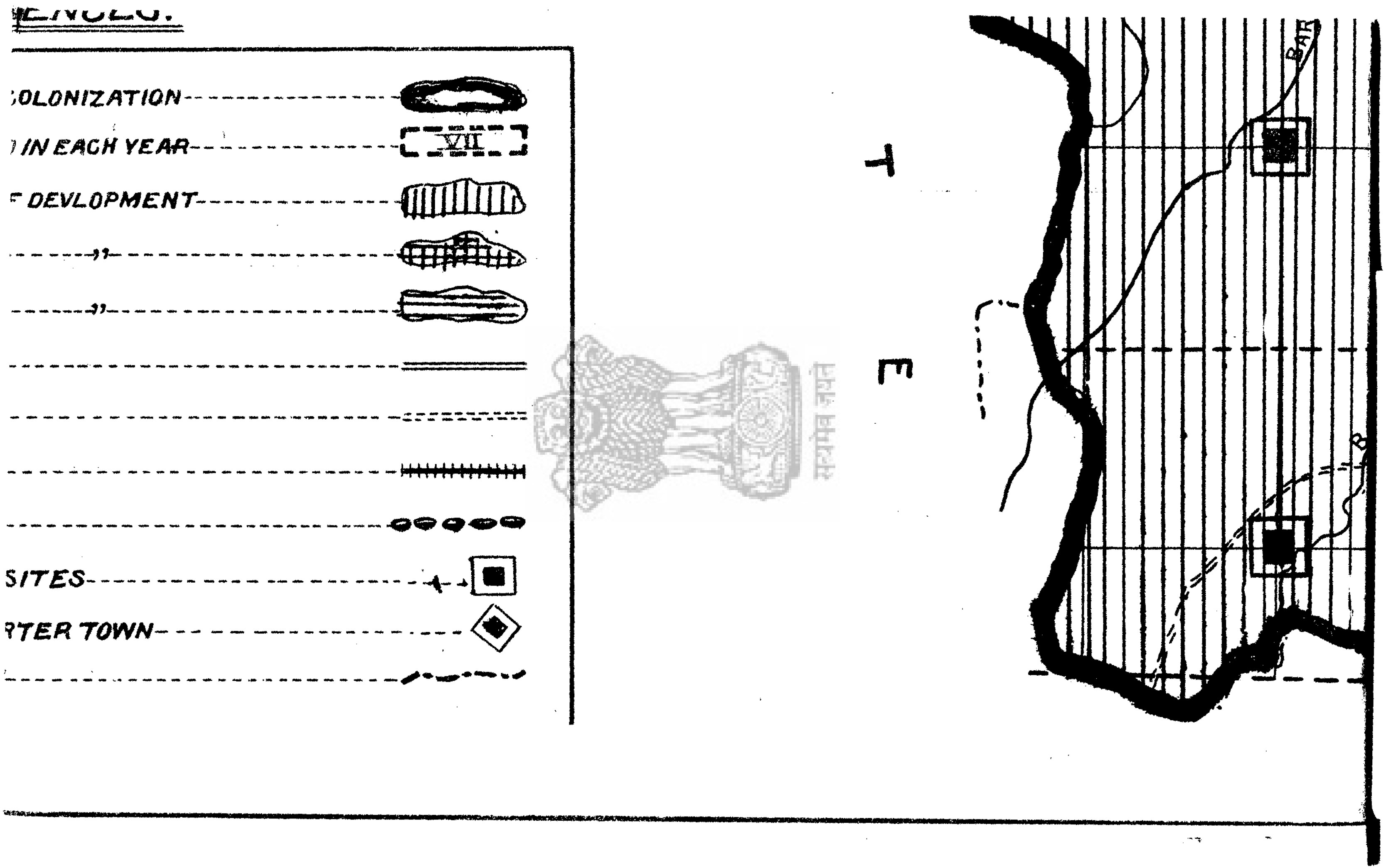

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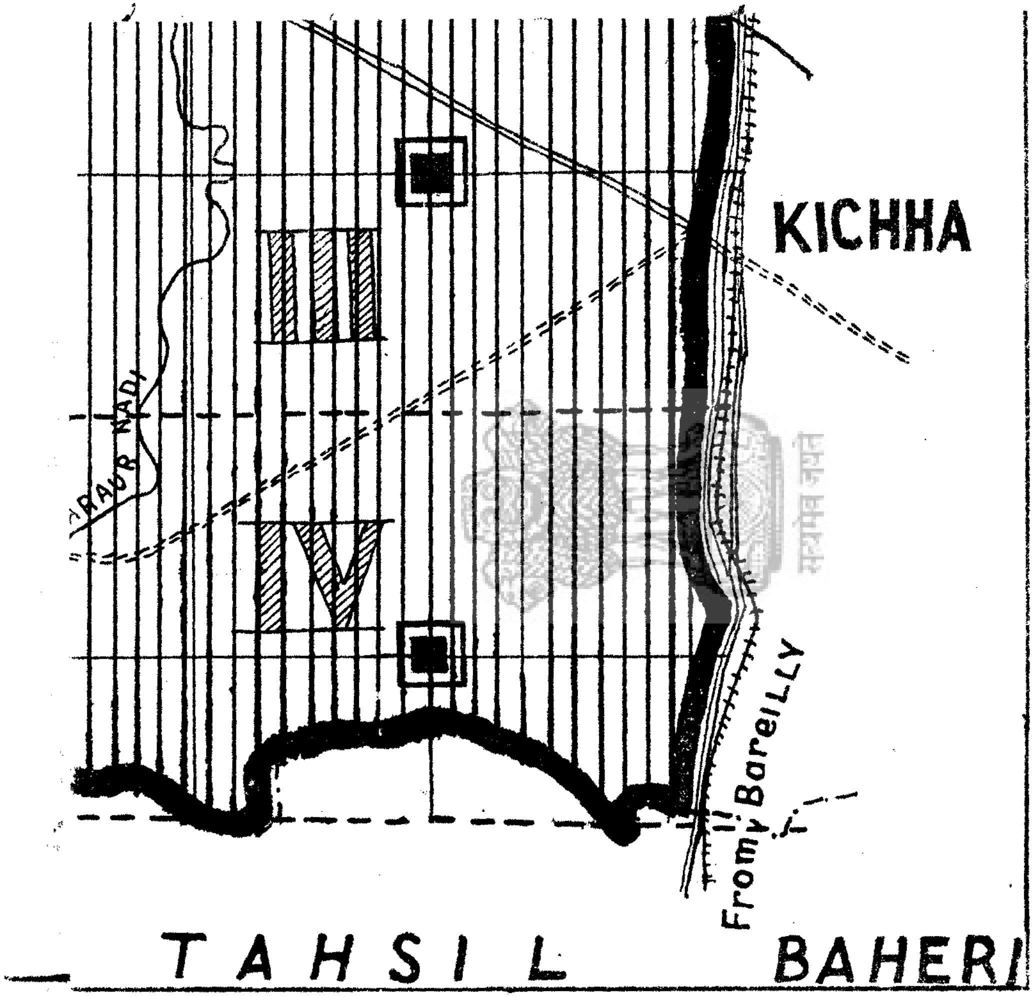

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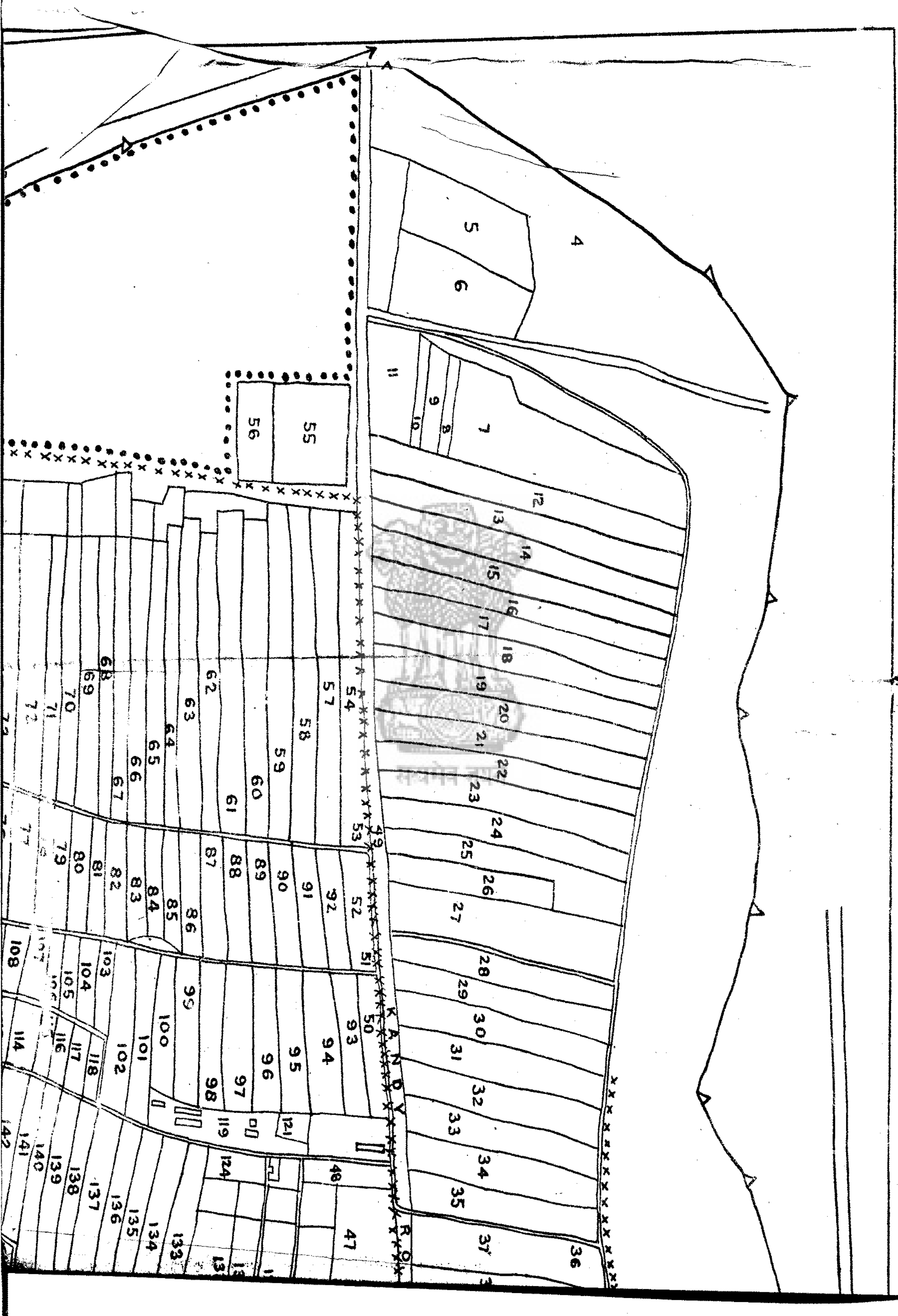
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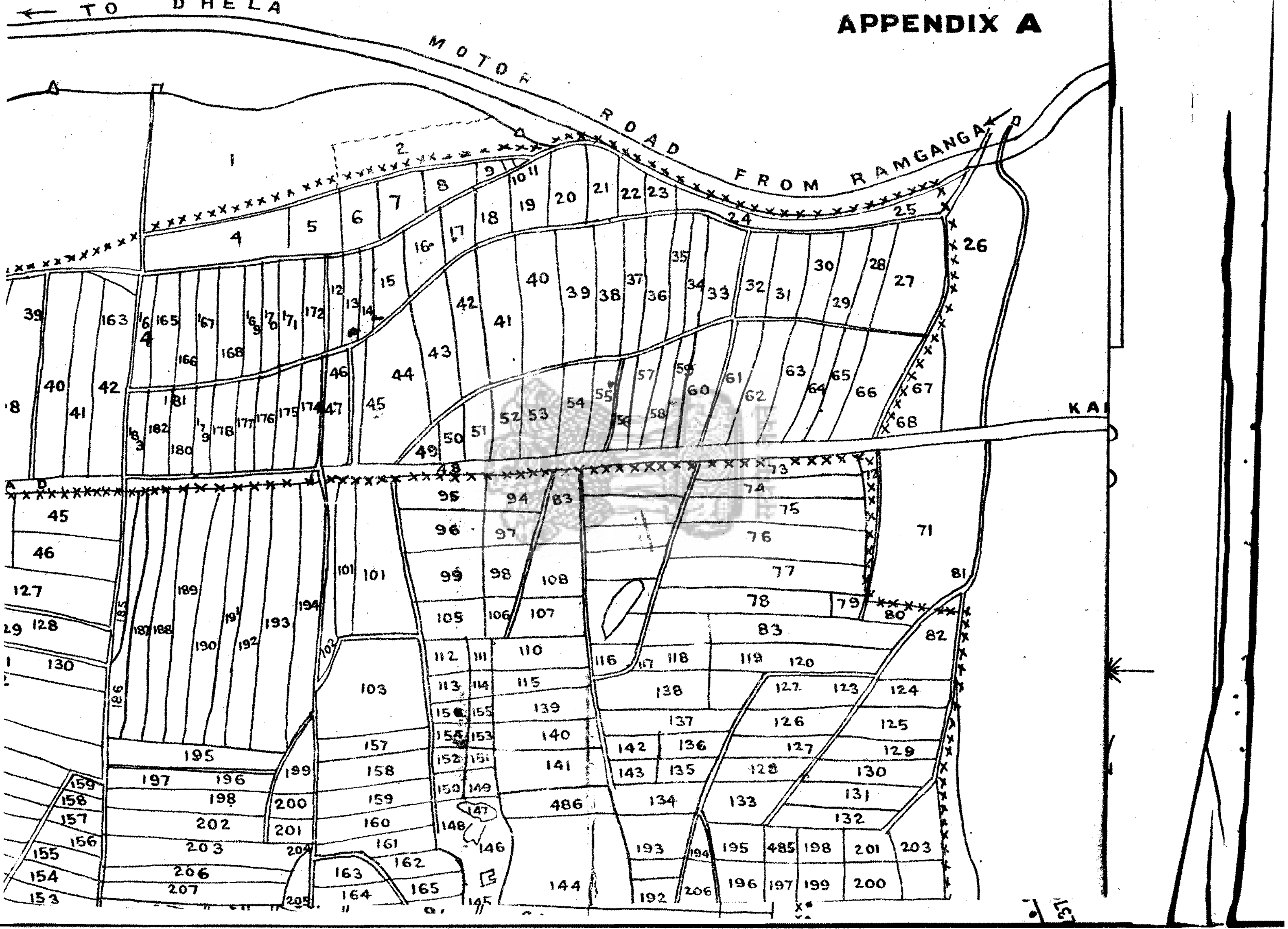
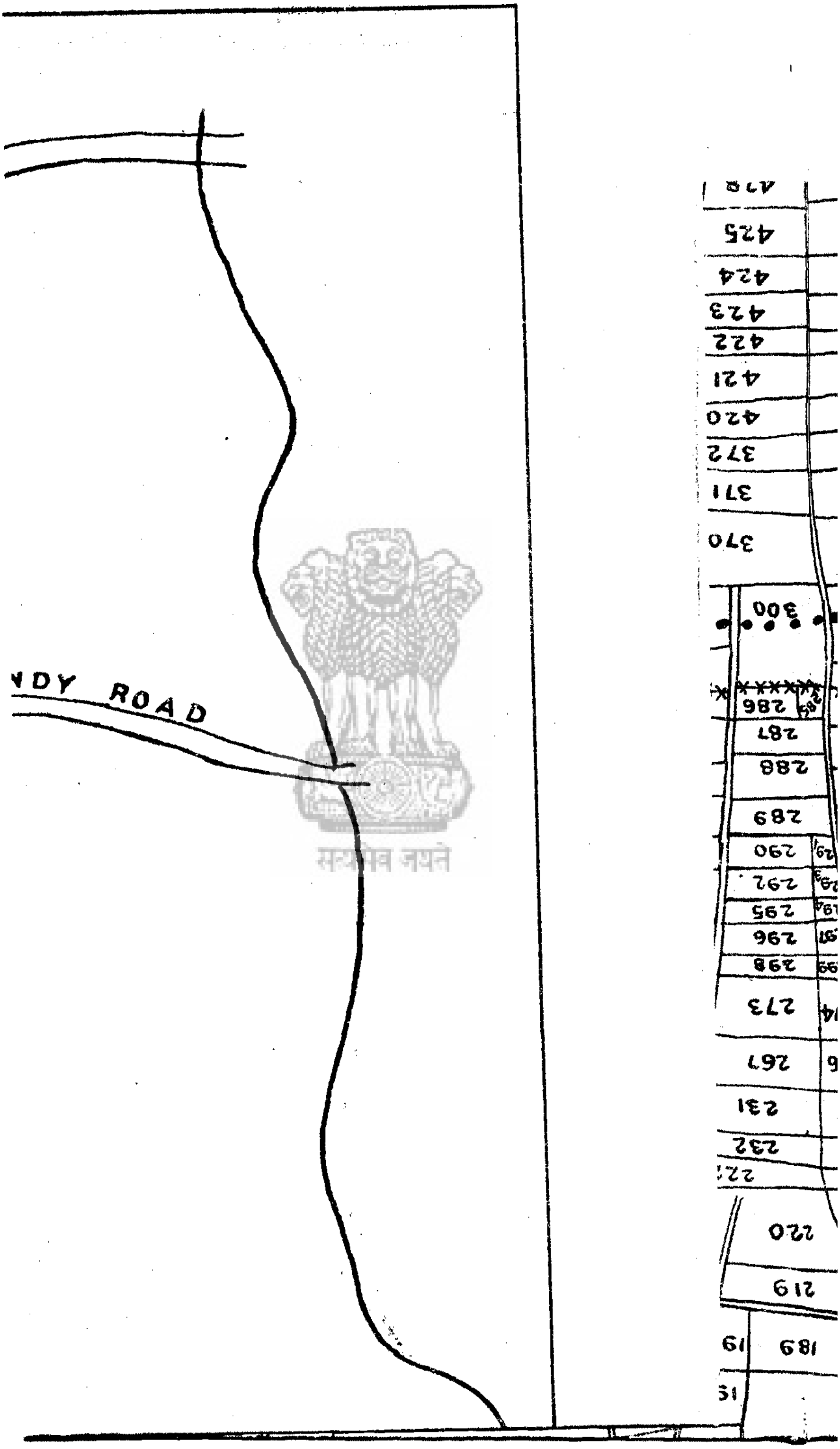
APPENDIX A

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सत्यमेव जयते

MAP OF VILLAGE

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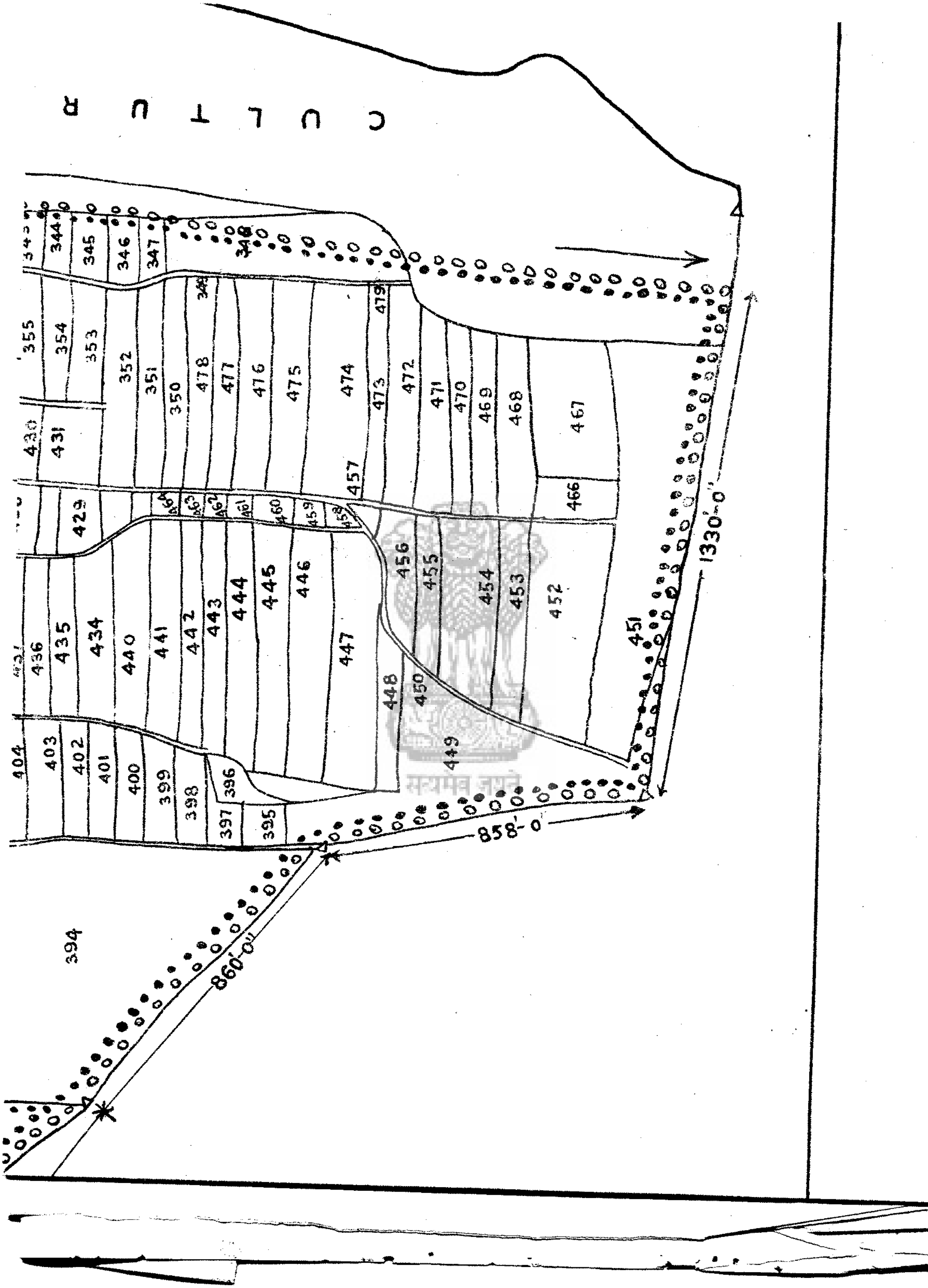
DISTRICT NAINI-TAL

SCALE 1" = 4 CHAINS (82$\frac{1}{2}$')

OR 16" = 1 MILE.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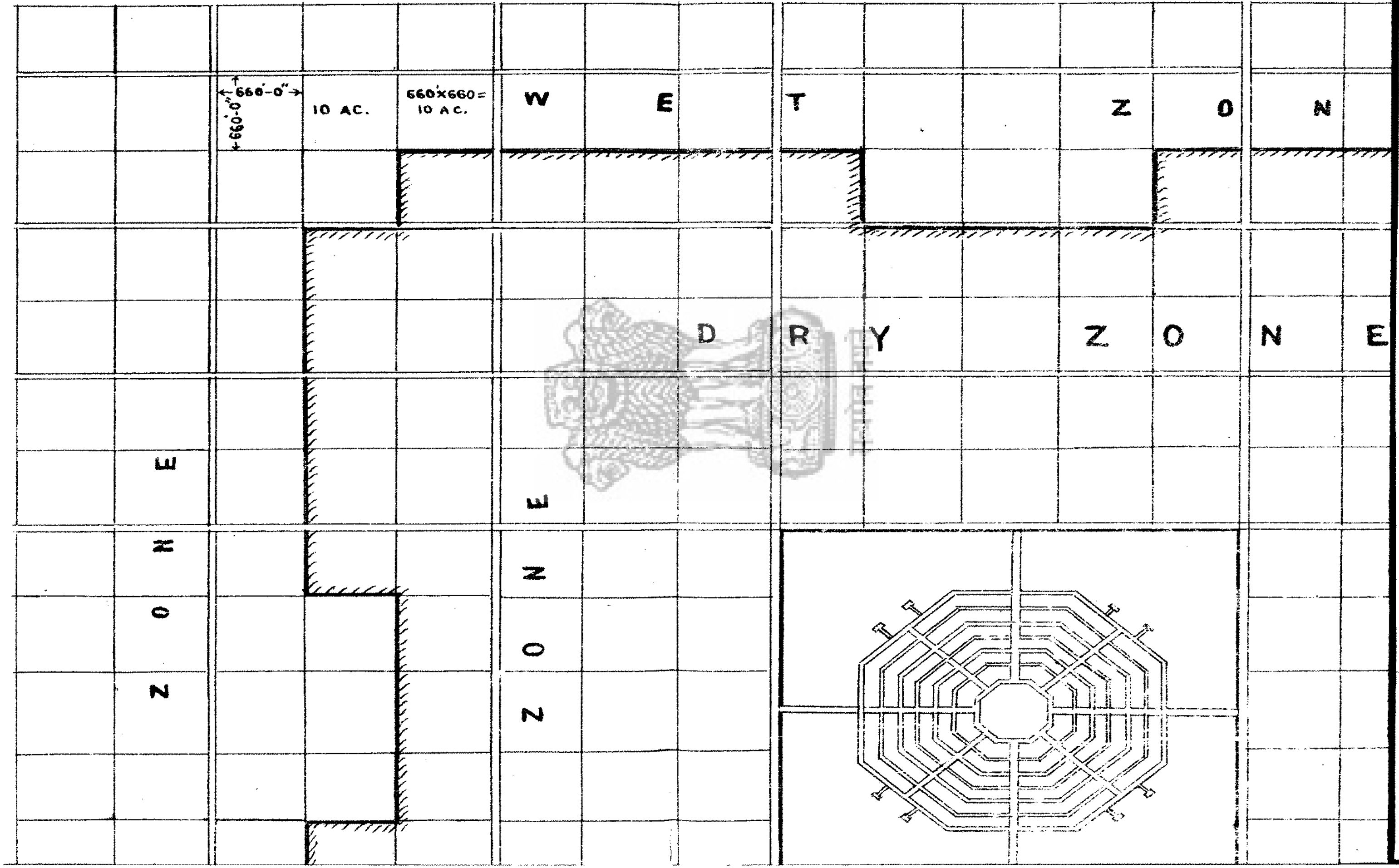
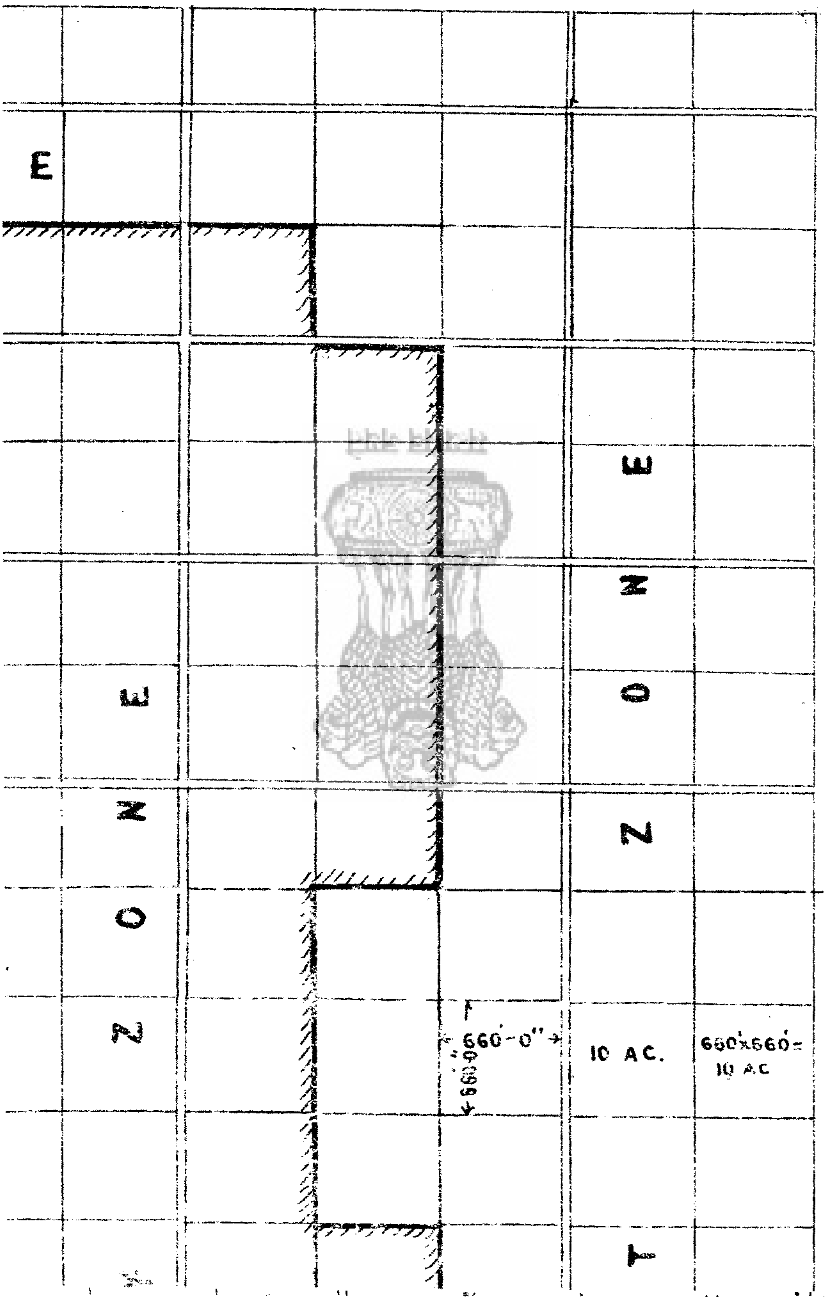
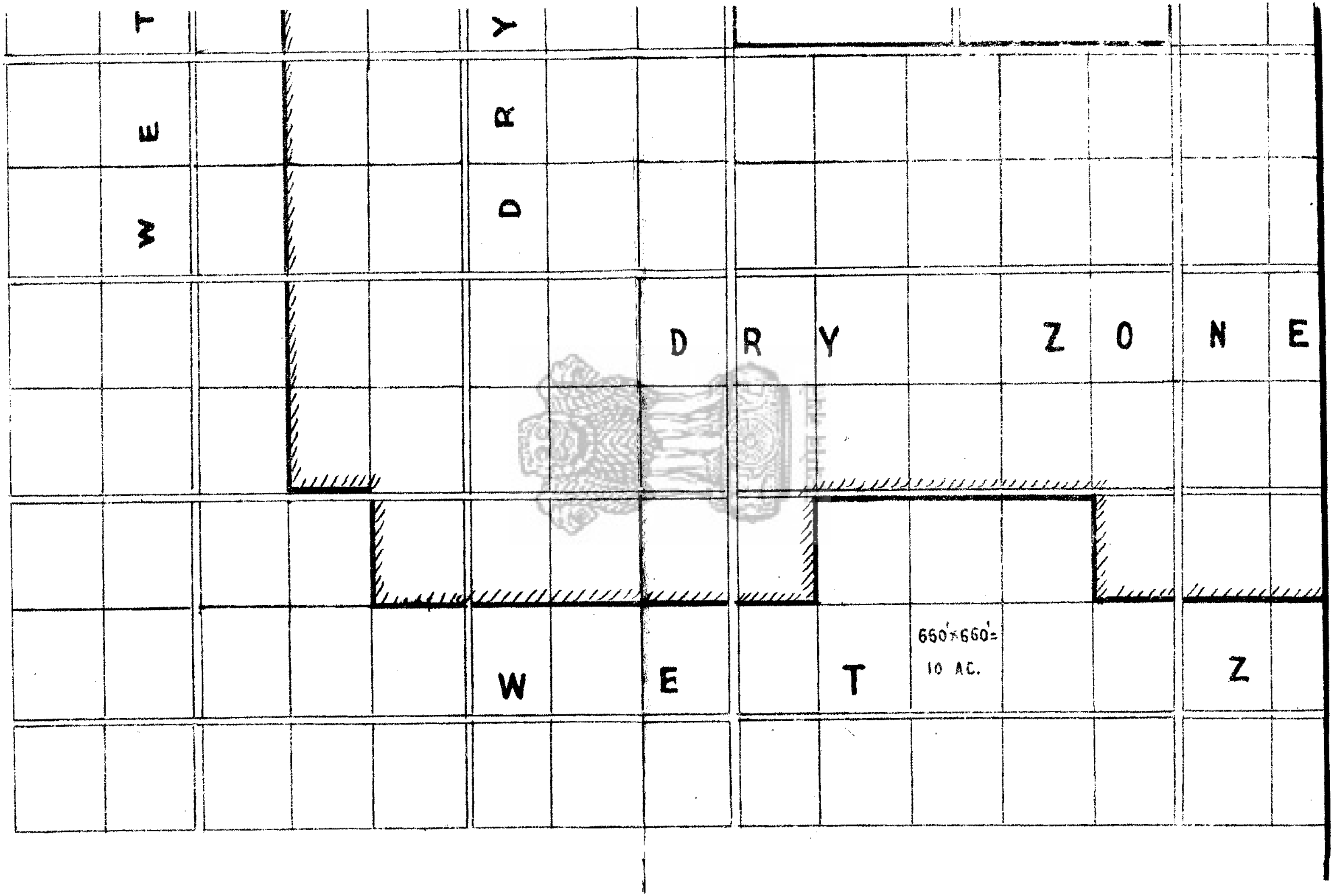


APPENDIX D

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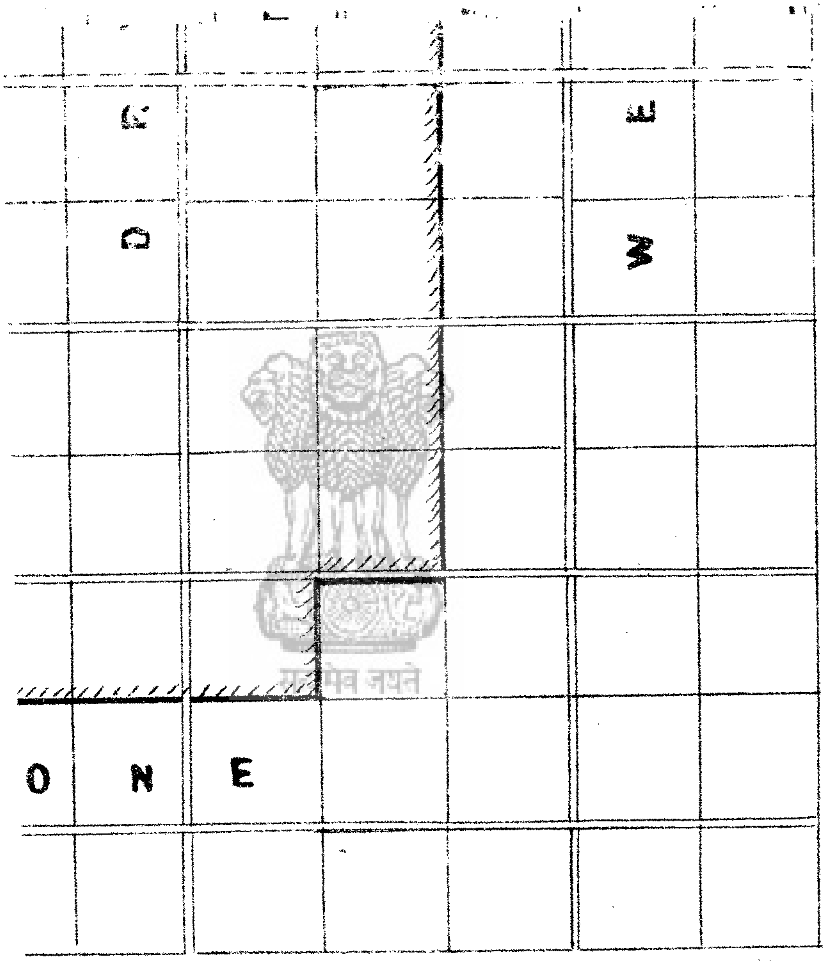

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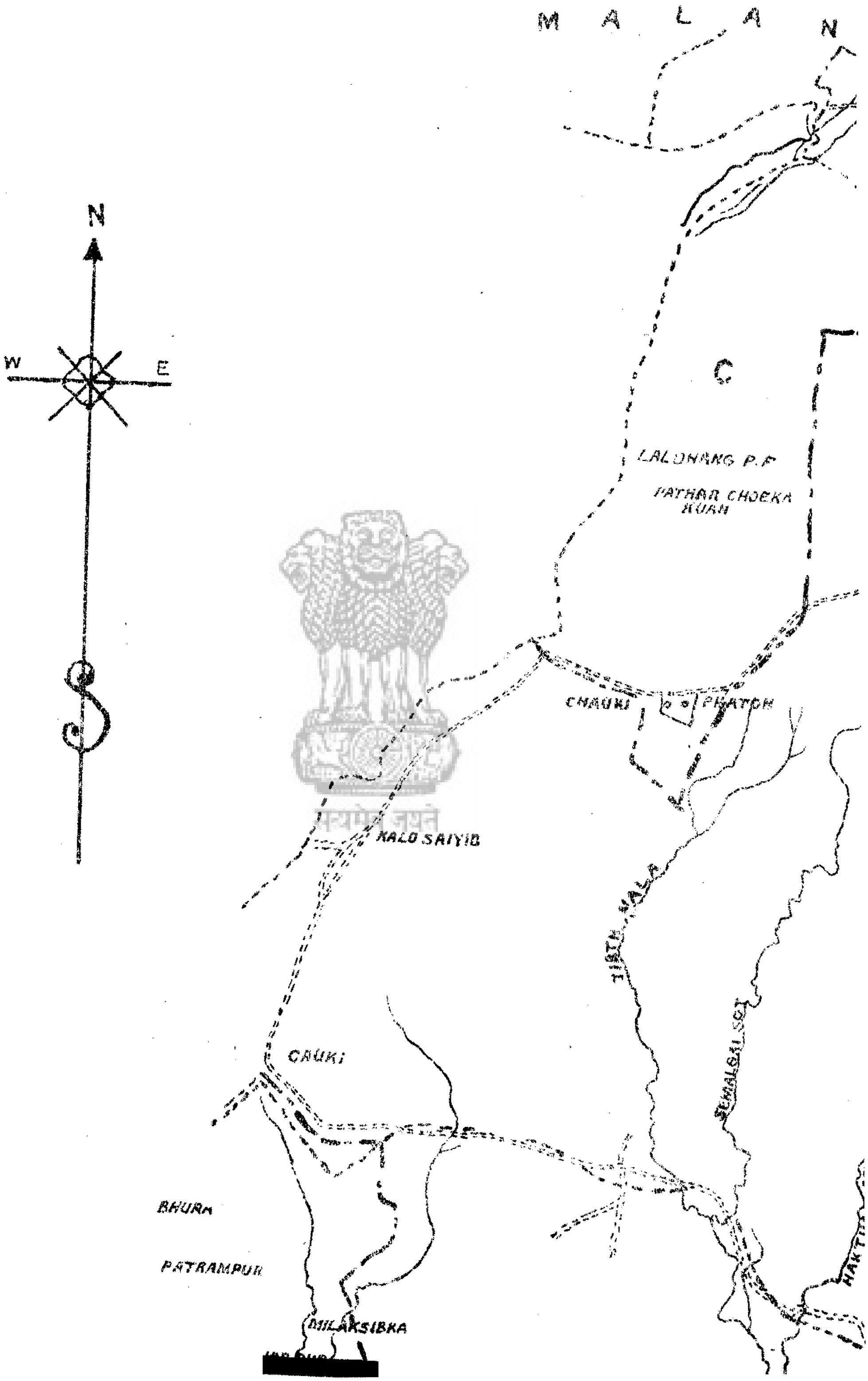
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TIRTH NALA
SEMALSALSOT
CAUKI
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PATRAMPUR
MILAKSIBKA
HAKT

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MAP OF A SECTI

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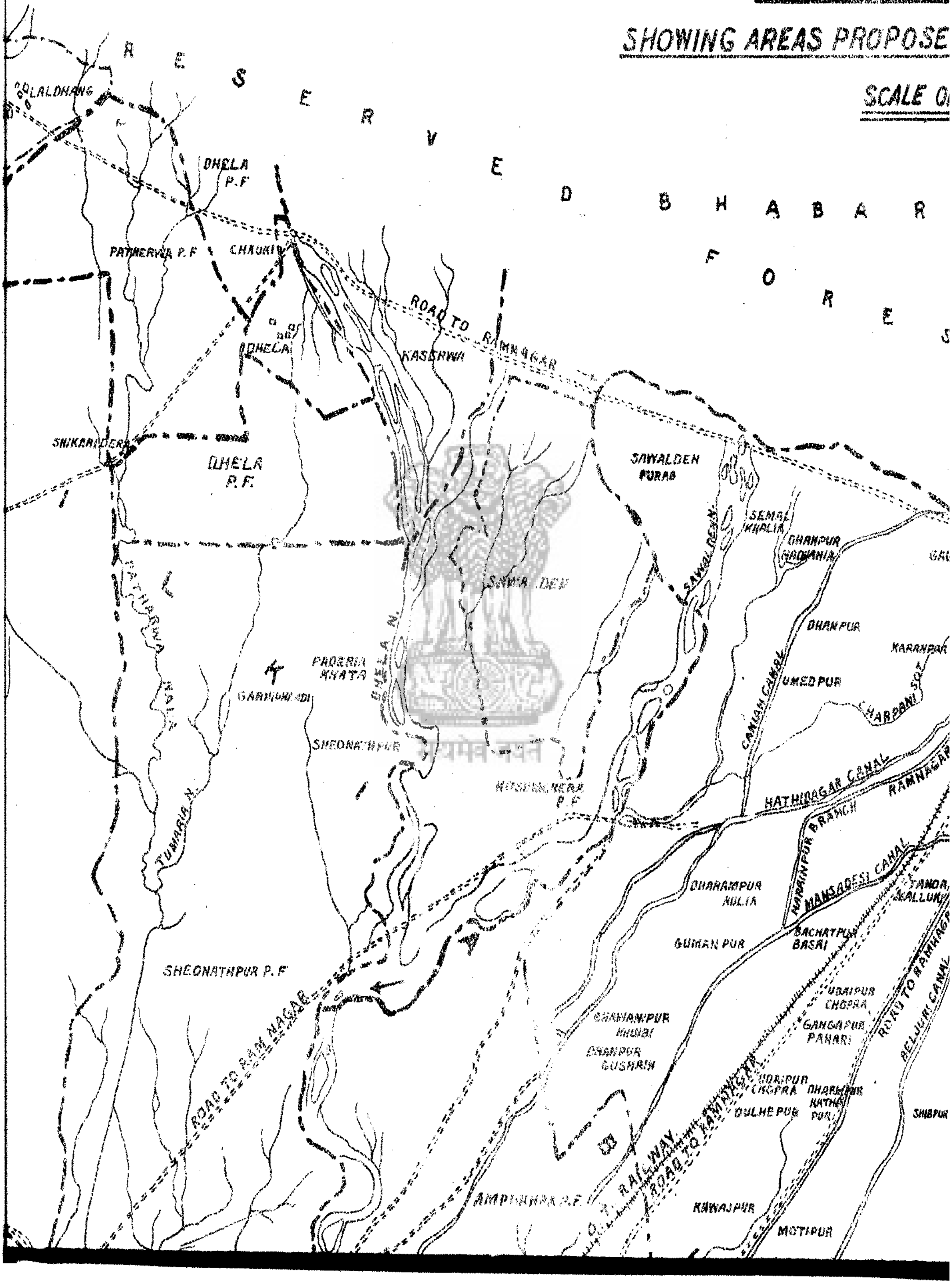
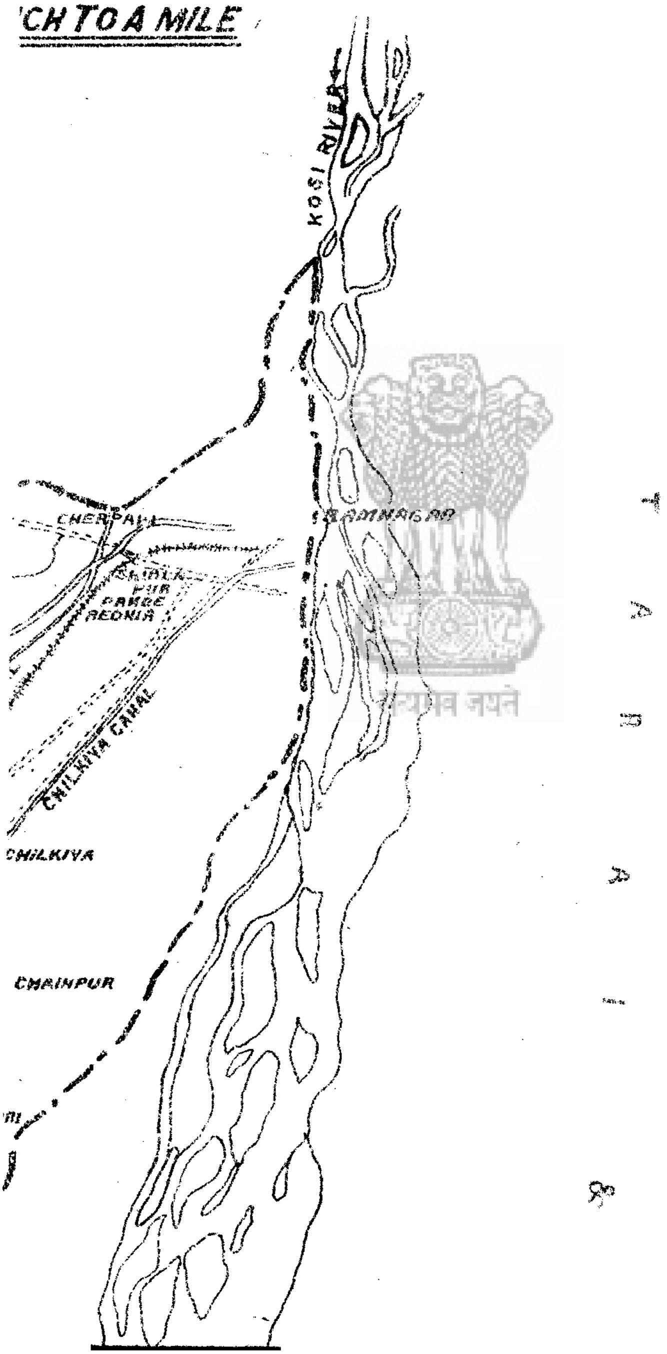


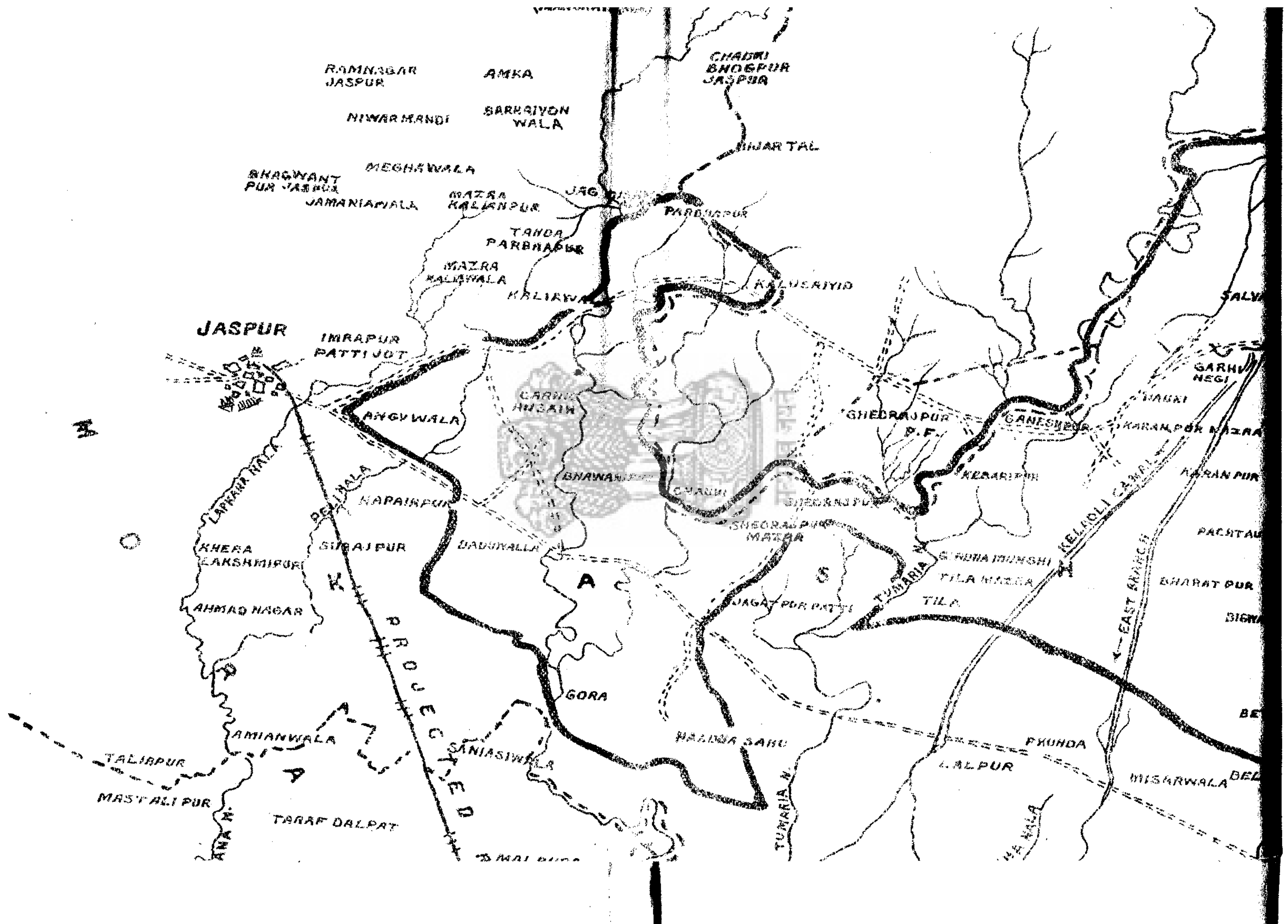
सत्यमेव जयते

APPENDIX C

OF KASHIPUR
NI TAL DISTRICT)
OR SOLDIER'S SETTLEMENT

CH TO A MILE

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AMKA
CHADRI BHOGPUR JASPUR
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SARRAIYON WALA
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JAMANIAWALA
MAZRA KALIANPUR
JAG
PARBHAPUR
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MAZRA KALIAWALA
KALIAWALA
KALUSAIYID
SALYA
JASPUR
IMRAPUR PATTI JOT
M
ANGUWALA
CARHI HUSAIN
GHEDRAJPUR P.F.
GANESHPUR
GARHI NEGI
HAUKI
KARANPUR MAZRA
KARANPUR
LAPKARA NALA
PELINALA
NARAINPUR
BHAWANI
CHAUDI
SHEORAJPUR
KESARIPUR
O
KHERA LAKSHMIPUR
SIRAJPUR
DADUWALA
SHEORAJPUR MAZRA
SINDHA MUNSHI
KELAOLI CANAL
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TUMARIA N.
BHARAT PUR
AHMAD NAGAR
JAGATPUR PATTI
TILA
EAST BRANCH
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D
GORA
BE
AMIANWALA
HAIDRA SAHU
FKUNDA
TALIPUR
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SANIASIWALA
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TARAF DALPAT
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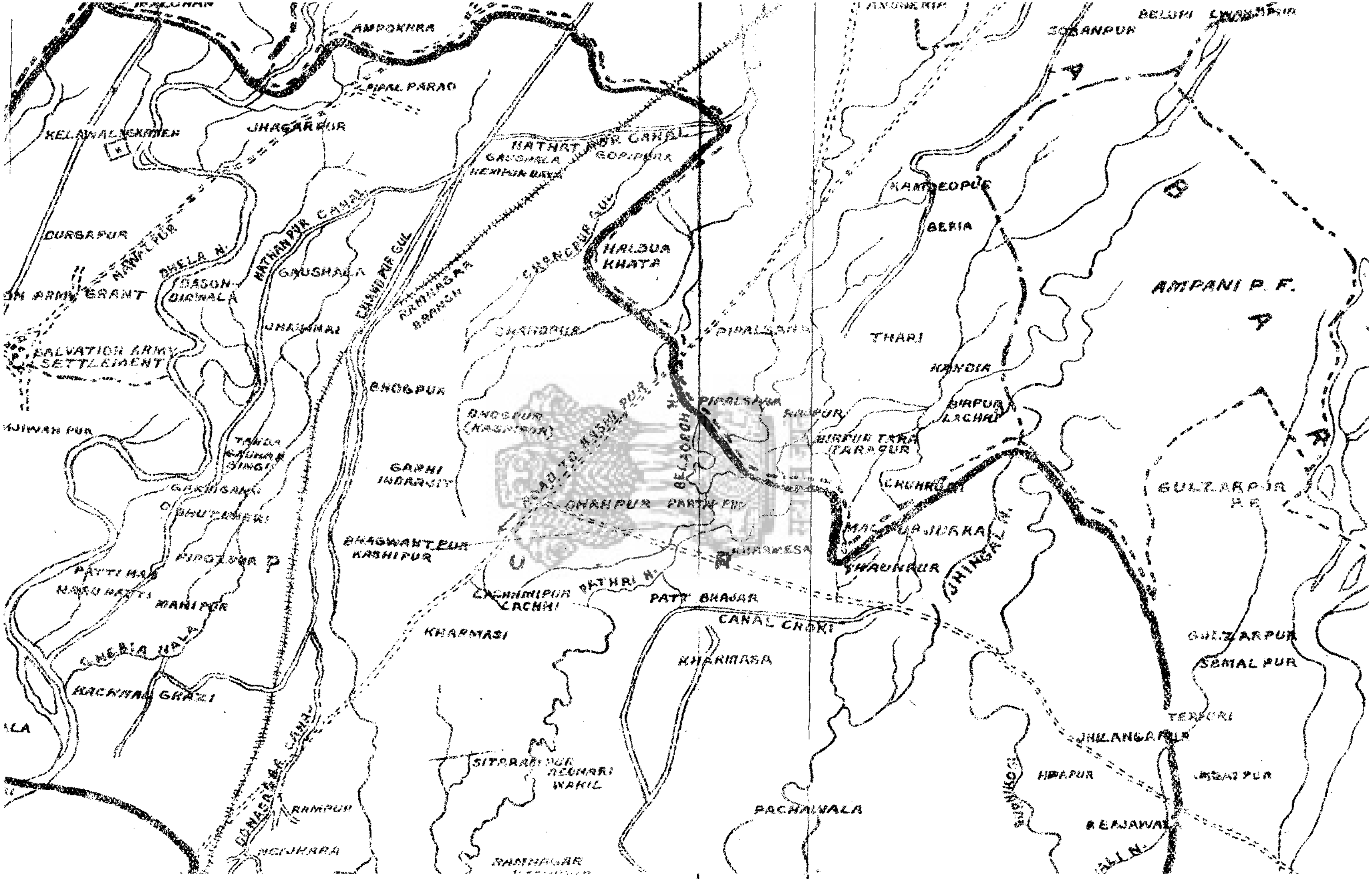
RAMALPURA
NALA


AMPOKHRA
PIPAL PARAO
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JHAGARPUR
RATHRI PUR CANAL
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DHELA N.
BASON DIRWALA
ARMY GRANT
MATHAN PUR CANAL
GAUSHALA
CHAND PUR GUL
RAMNAGAR BRANCH
CHANDPUR GUL
HALDUA KHATA
JHAUNAI
SALVATION ARMY SETTLEMENT
BHOGPUR
CHANDPUR
PIPALSANA
KAMDEOPUR
BERIA
THARI
AMPANI P. F.
KANDIA
BIRPUR LACHHI
BHOGPUR (KASHIPUR)
ROAD TO KASHIPUR
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RAMPUR
BIRPUR TARA TARAPUR
JIWAN PUR
TANDA GAUHAR SINGH
GARHI INDRAJIT
BELAORGH N.
GAKHIGANG
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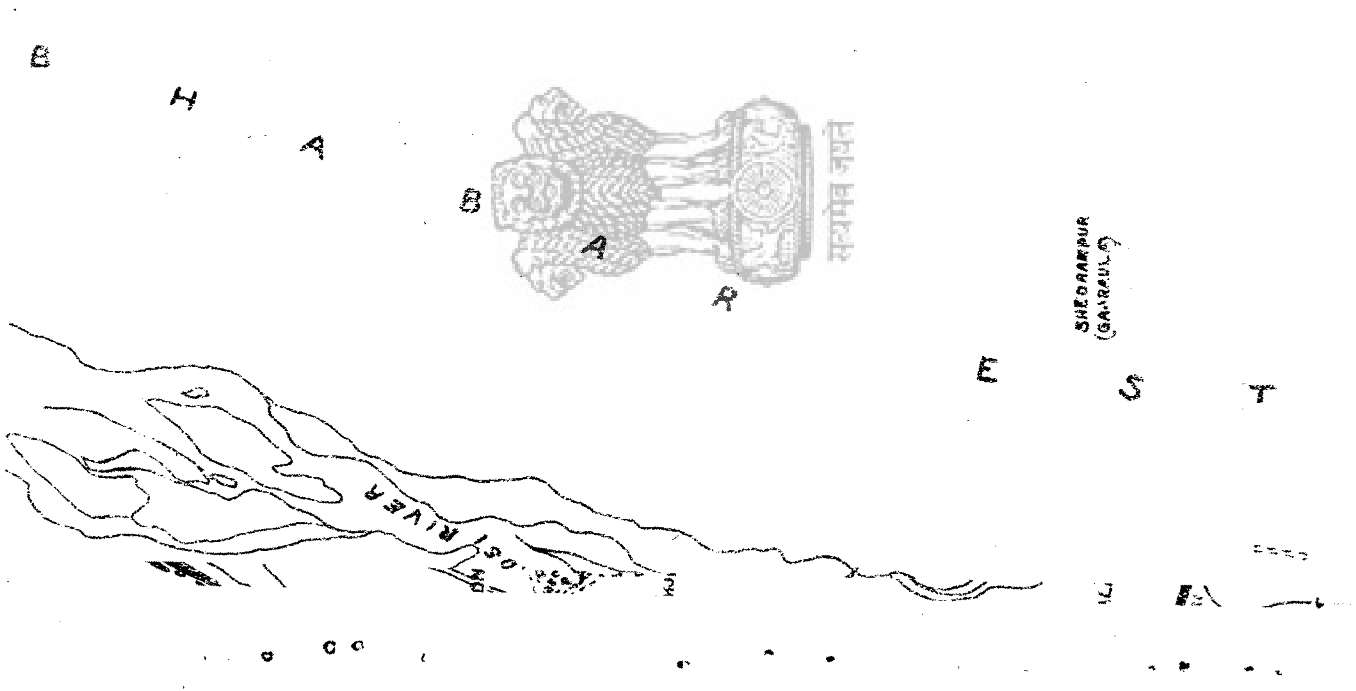
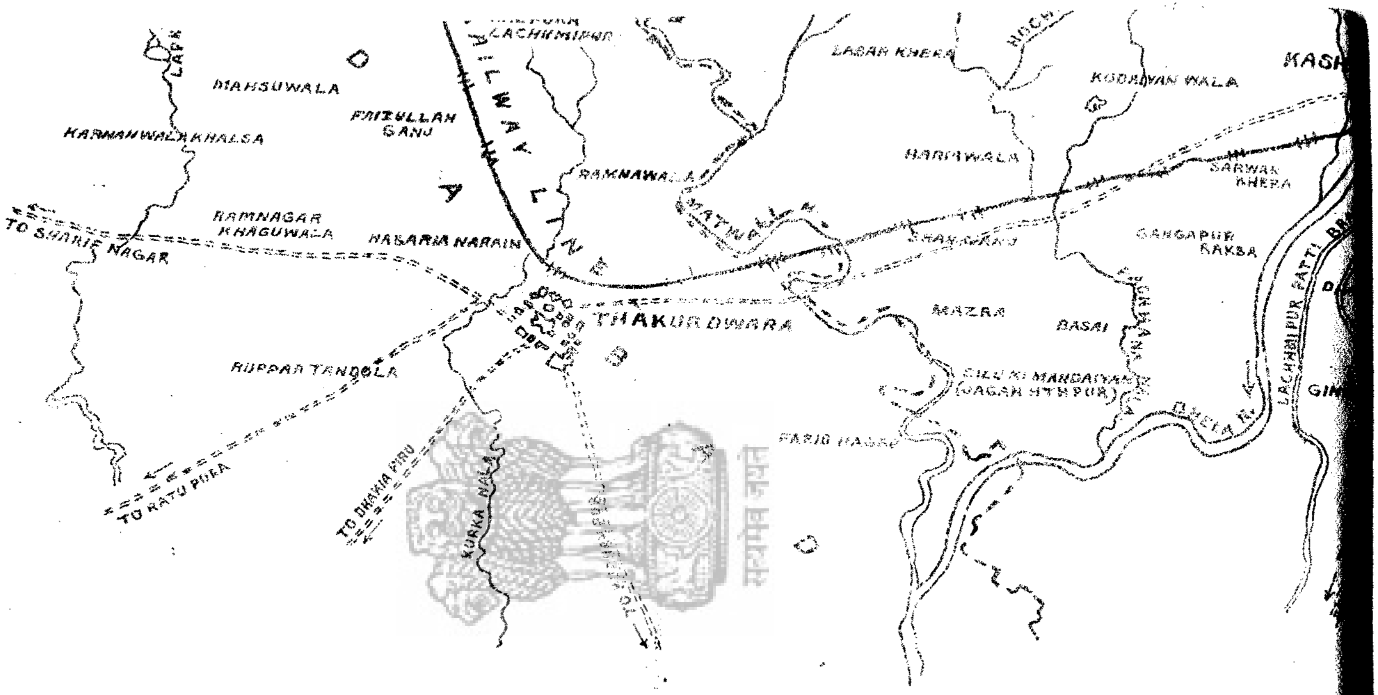
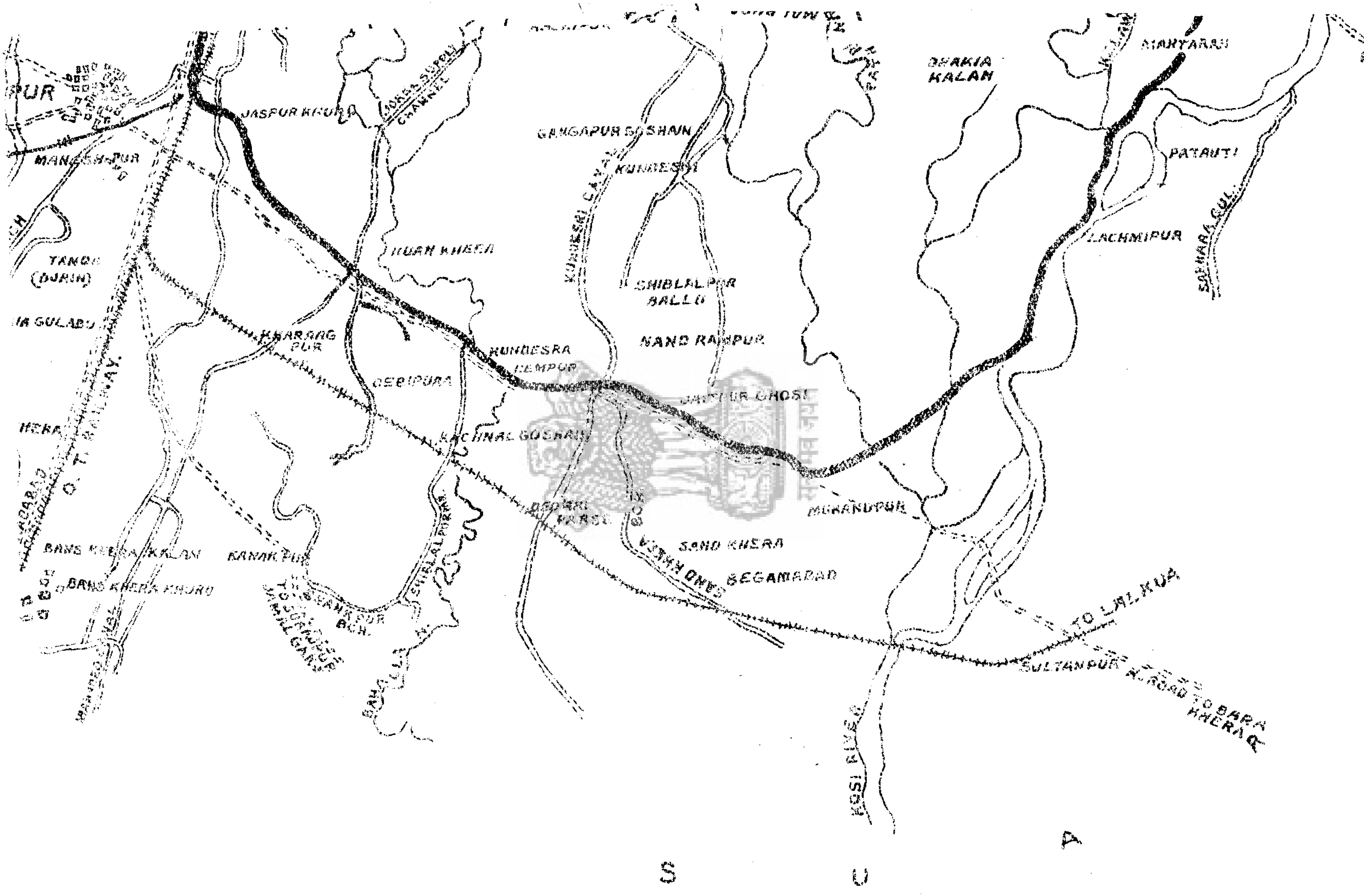
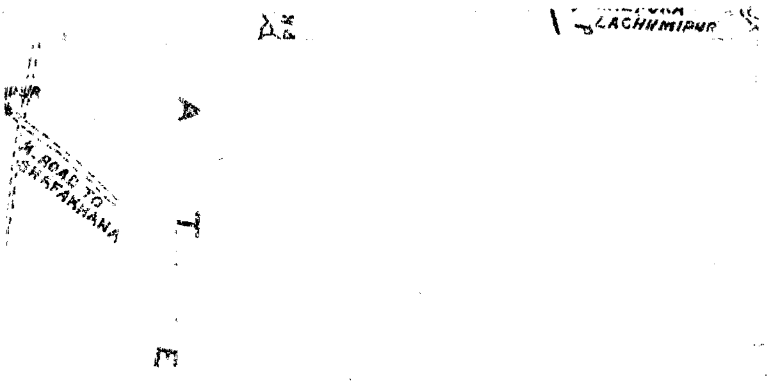
CHUHRPUR
GULZARPUR R.F.
PIROZPUR
BHAGWANT PUR KASHIPUR
NAKU PATTI
PATTI HAS
MANIPUR
LACHHMIPUR LACHHI
PATHRI N.
KHARMESA
MAL PUR JURKA
JHAUNPUR
JHINGAL N.
PATT BHAJAR
CANAL CHOKI
KHARMASI
KHARIMASA
GHEBIA NALA
KACHNAL GHAZI
GULZARPUR
SEMAL PUR
TEHDRI
JHILANGA PUR
SITARAMPUR
AGHARI WAKIL
DONAS CANAL
RAMPUR
HIRAPUR
MAZAT PUR
PACHAIWALA
BEJAWAL
NEJHRRA
RAMNAGAR
LA
SOBANPUR
BELURI
P
U
R
A
B
A
R


B H A B A R
E S T
KOSI RIVER
SHEORAMPUR
(GAJRAULA)


LAPK
MAHSUWALA
D
FAIZULLAH GANJ
KARNAHWALA KHALSA
A
RAILWAY LINE
LACHHMIPUR
RAMNAWALA
LASAR KHERA
HOCH
KODAIYAN WALA
KASH
HARIPWALA
SARWAK KHERA
RAMNAGAR KHAGUWALA
TO SHARIF NAGAR
HASARIA NARAIN
MATHWALI N.
SHAHGARH
GANGAPUR KAKSA
THAKURDWARA
MAZRA
BASAI
B
RUPPAR TANGOLA
SILU KI MANDAIYAN (GAGAN NATHPUR)
DHELA R.
LACHHMIPUR PATTI BR
GIM
FARID NAGAR
TO RATU PURA
TO DHAKIA PIRU
KURKA NALA
C

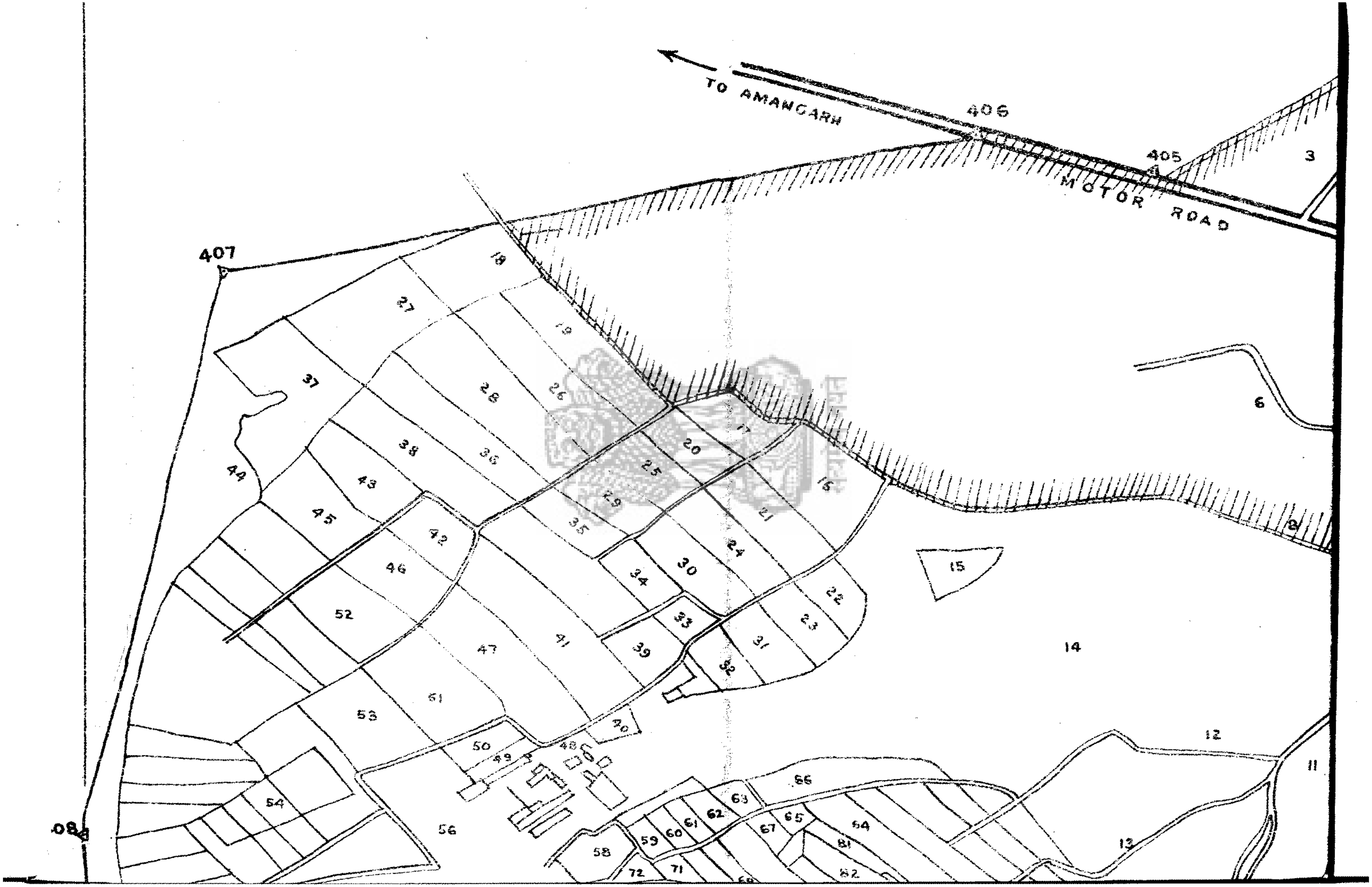

PUR
MANESHPUR
JASPUR KHURD
SUPPLY CHANNEL
GANGAPUR GOSHAIN
KUNDESHI
DHAKIA KALAN
MANTARAJ
PATAUTI
LACHMIPUR
SAHARA GUL
TANDA (DJRIN)
JUAN KHERA
SHIBLALPUR BALLO
IA GULABU
KHARAGG PUR
KUNDESRA CEMPUR
NAND RAMPUR
KUNDESHI CANAL
DEBIPURA
JASPUR GHOSI
HERA
O. T. RAILWAY.
KACHNAL GOSHAIN
MUKANDPUR
BAKARI KERSA
SAND KHERA
SAND KHERA
BEGAMABAD
BANS KHERA KALAN
KANAKPUR
BANS KHERA KHURD
TO SUPAIRI JAMALGARH
MAHANPUR BCH.
SHIBLALPURA
BAHALLA N.
TO LALKUA
SULTANPUR K. ROAD TO BARA KHERA
KOSI RIVER
S
U
A



REFERENCES

UNMETALLED ROADS	=======
RIVERS	〰
NALAS	〰
CANALS	CANAL
RAILWAY LINE	┼┼┼┼
PROJECTED RAILWAY LINE	┼┼ ┼┼ ┼┼
BOUNDARY LINE OF THE AREAS PROPOSED FOR SOLDIERS SETTLEMENT.	
BOUNDARY RESERVED FOREST	
BOUNDARY DISTRICT. SUB-DIVISION (TAHSIL)	

सत्यमेव जयते


TO AMANGARH
406
405
MOTOR ROAD
407
08
3
18
27
19
37
28
26
17
20
25
16
44
38
36
43
29
21
45
42
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24
46
30
34
22
15
6
8
52
23
33
47
41
39
31
14
32
61
53
40
50
49
48
12
11
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66
63
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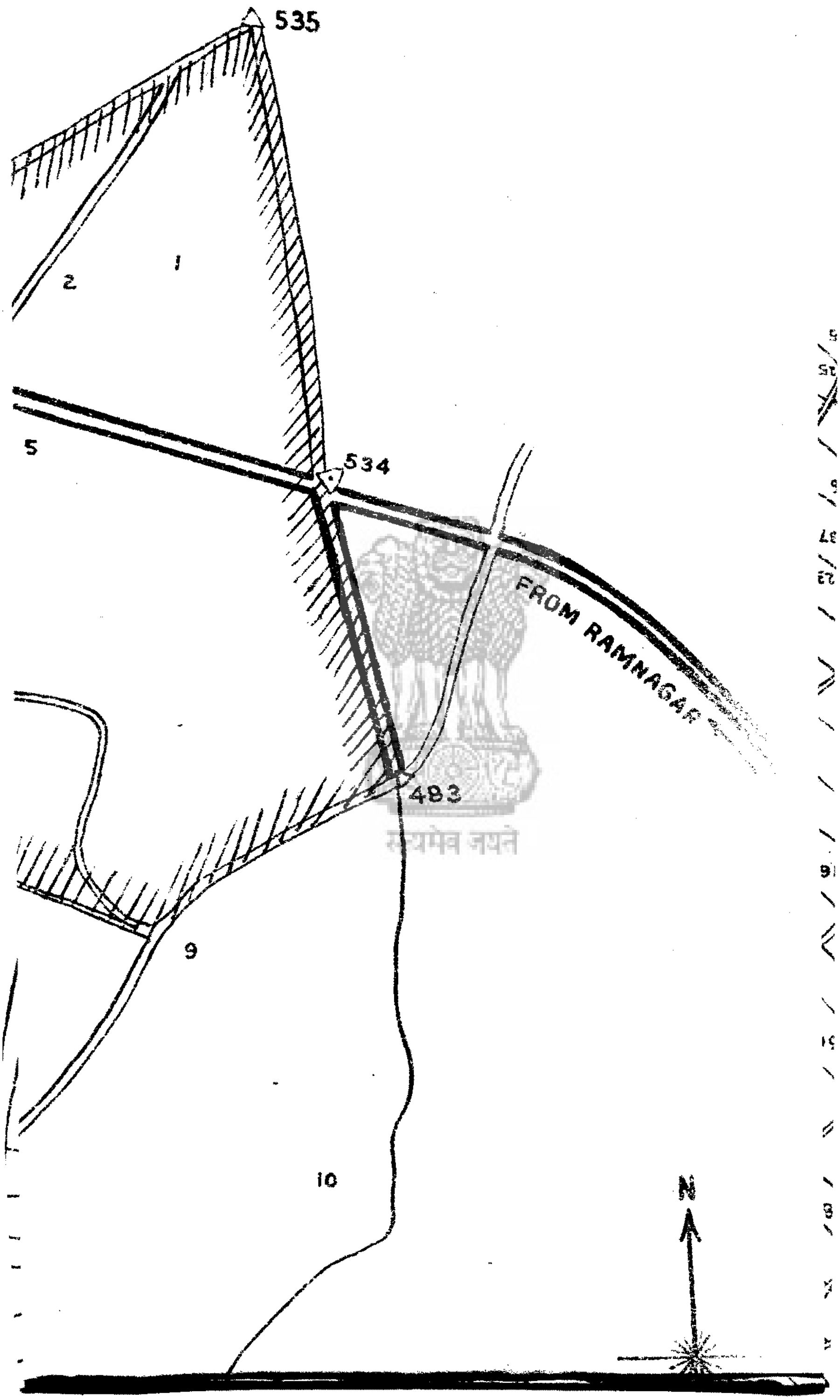
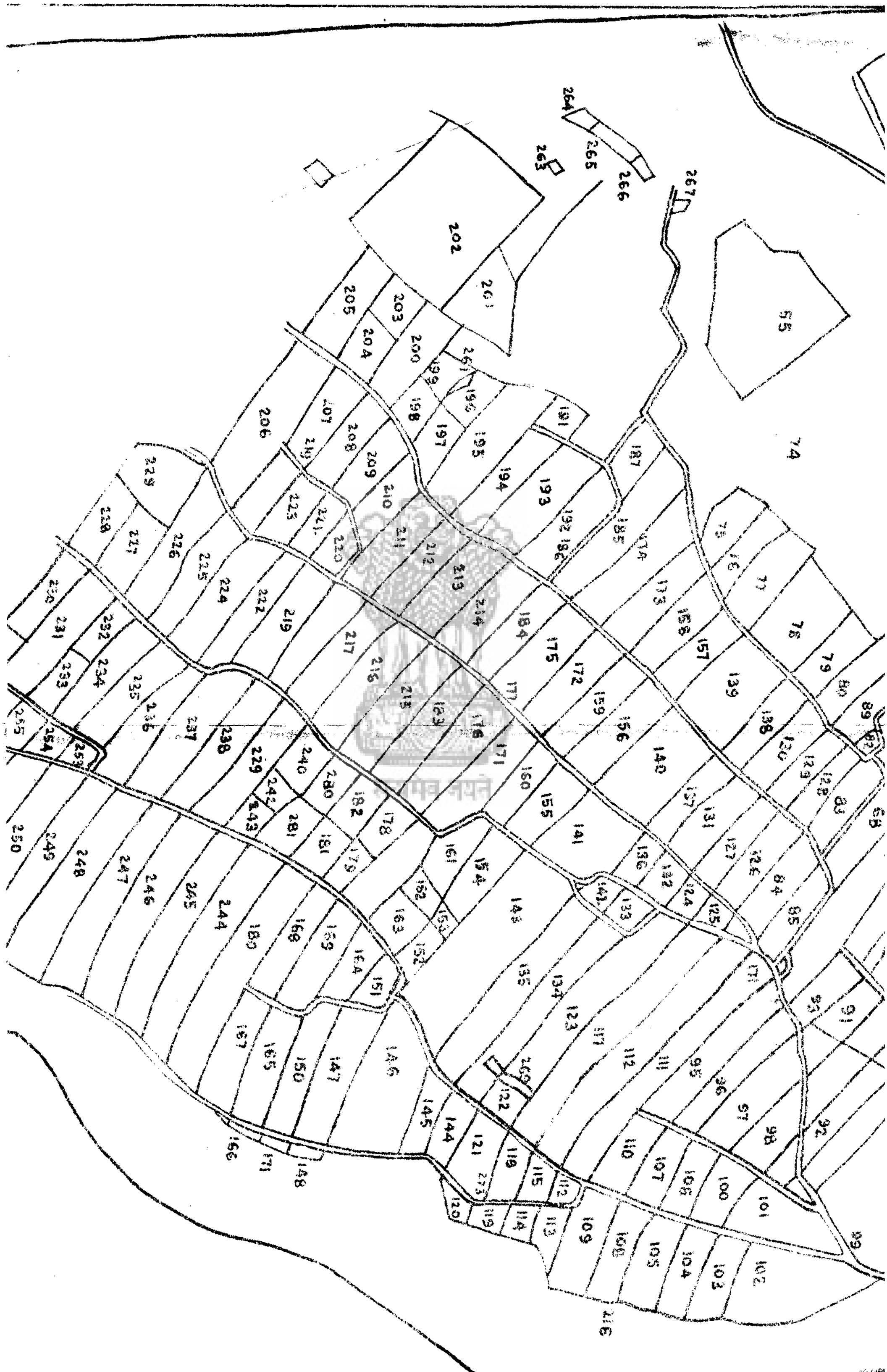
61
60
59
58
65
67
64
81
82
72
71
69
13



सत्यमेव जयते


202
201
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206
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187
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74
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265
266
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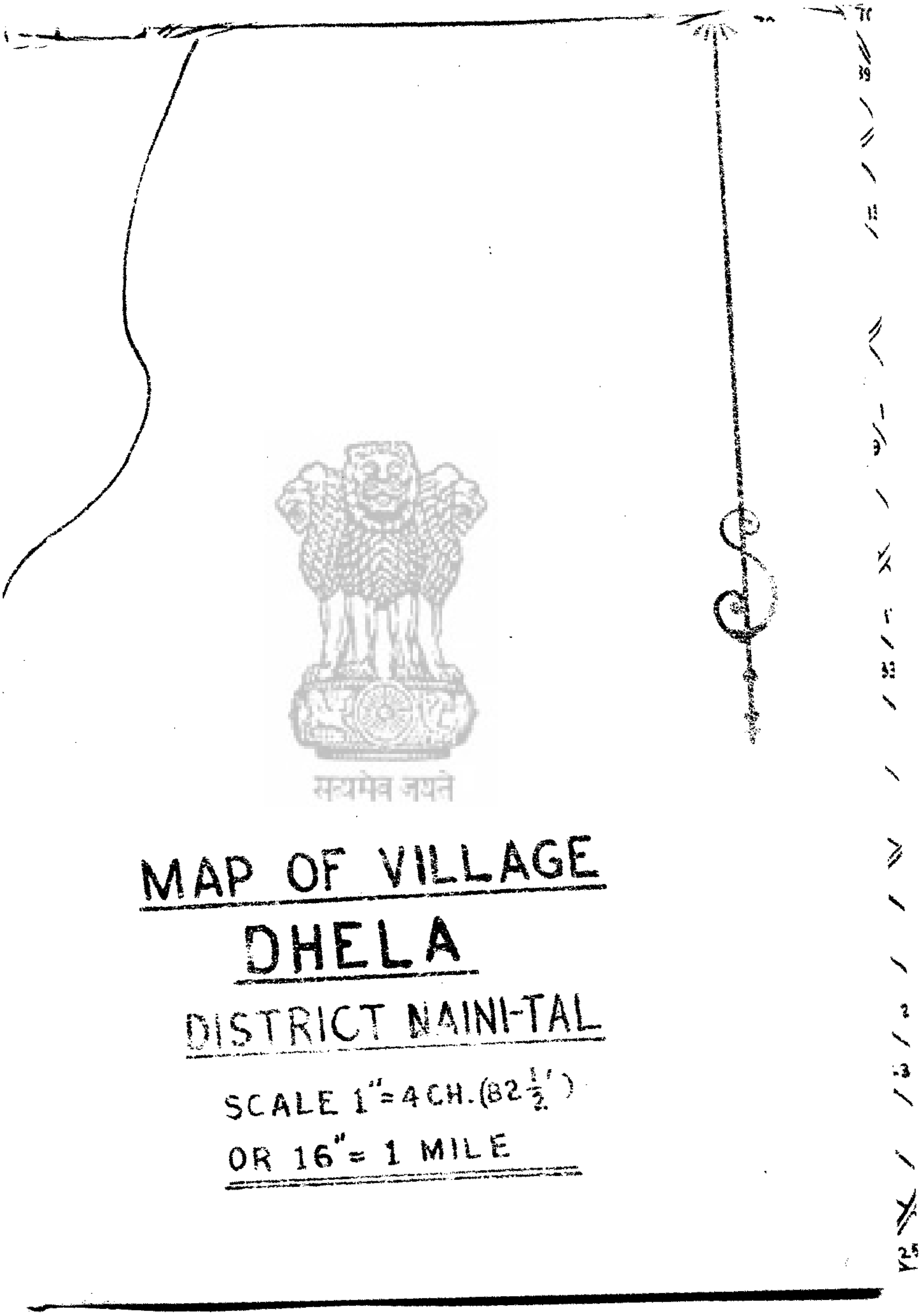
130
131
132
133
136
137
260
273
सत्यमेव जयते



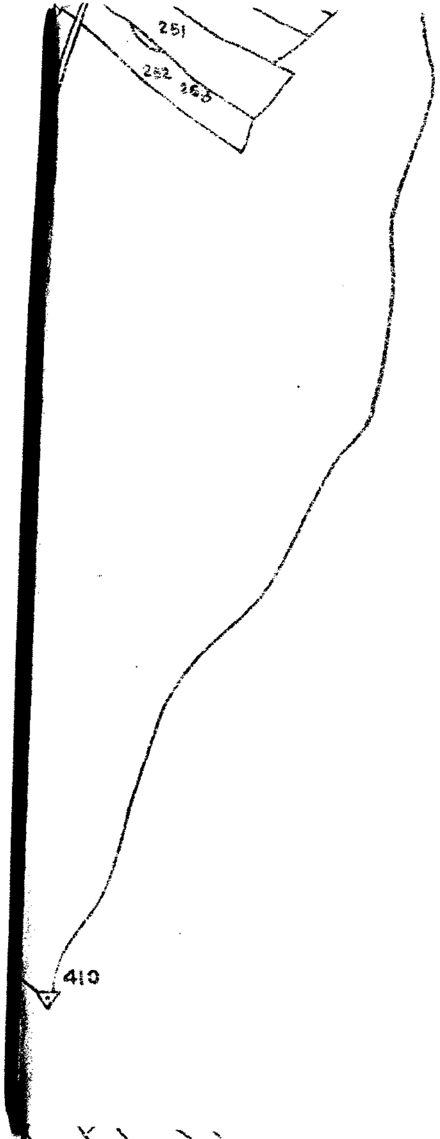
MAP OF VILLAGE

DHELA

DISTRICT NAINI-TAL

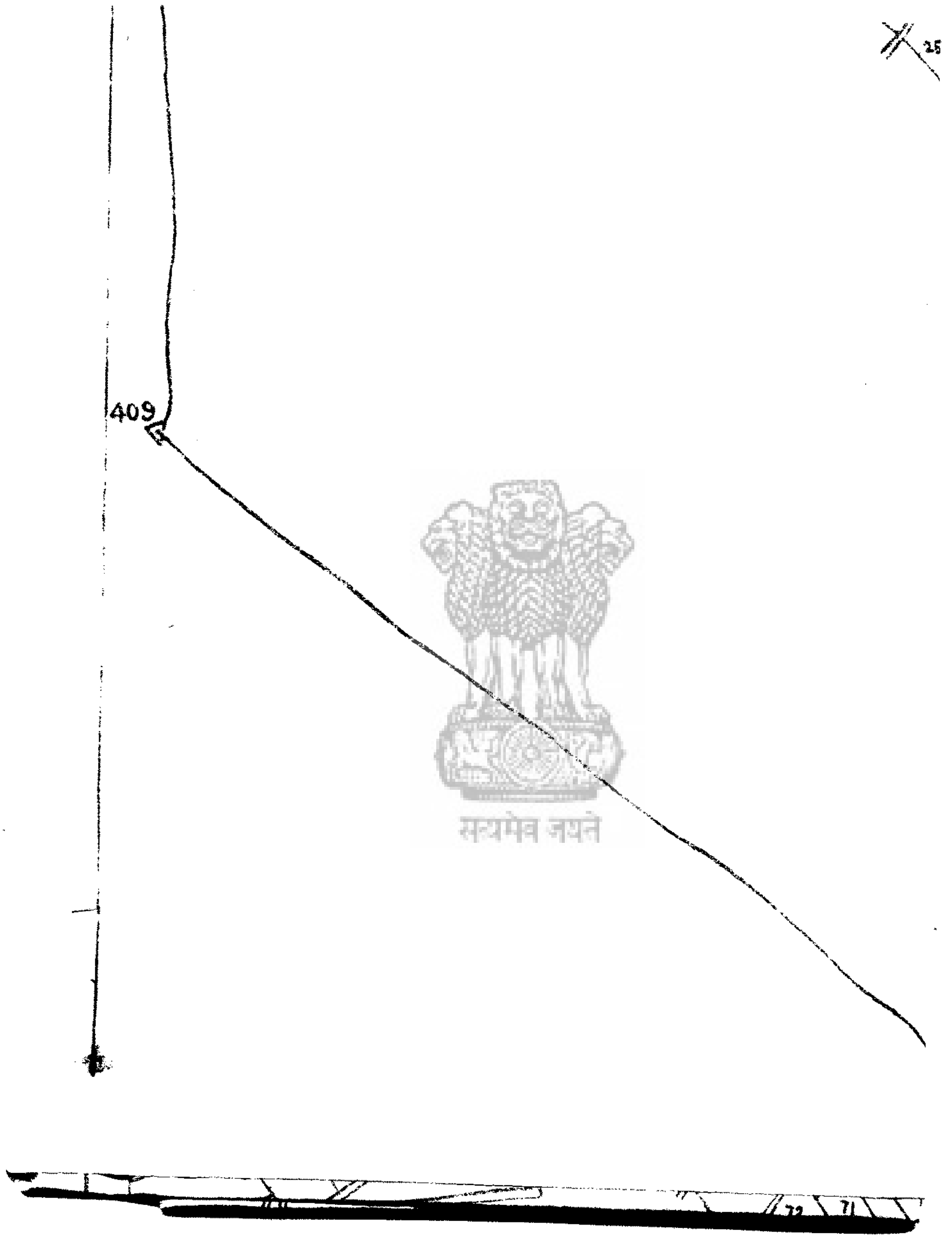
SCALE 1" = 4 CH. (82½')

OR 16" = 1 MILE

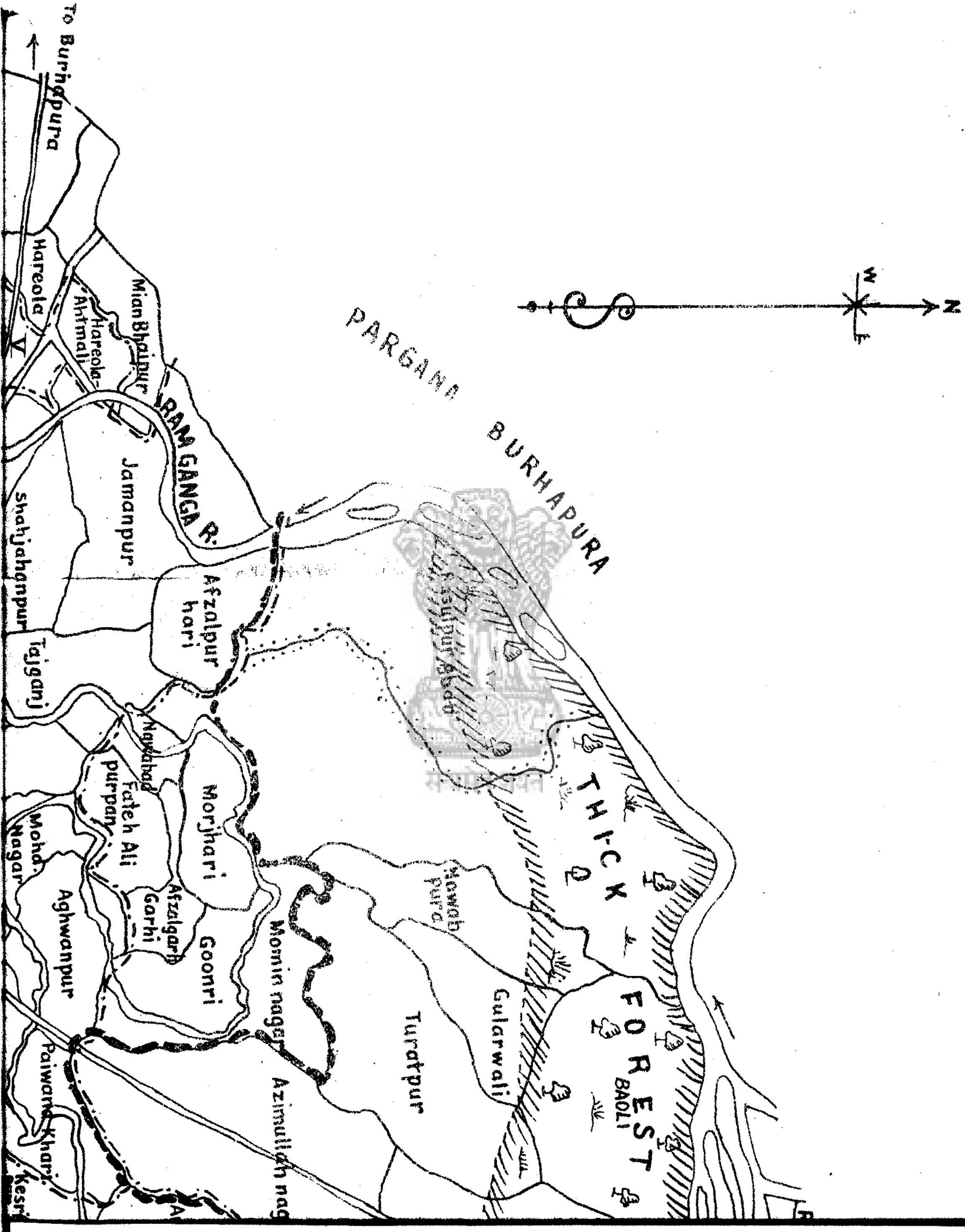


REFERENCES

FEILDS....................................	▭
GULS (WATER CHANNELS)............	=
ROADS....................................	▬
AREA WHICH THE PROPRIETOR WANTS TO EXCLUDE FROM SETTLEMENT.	▨



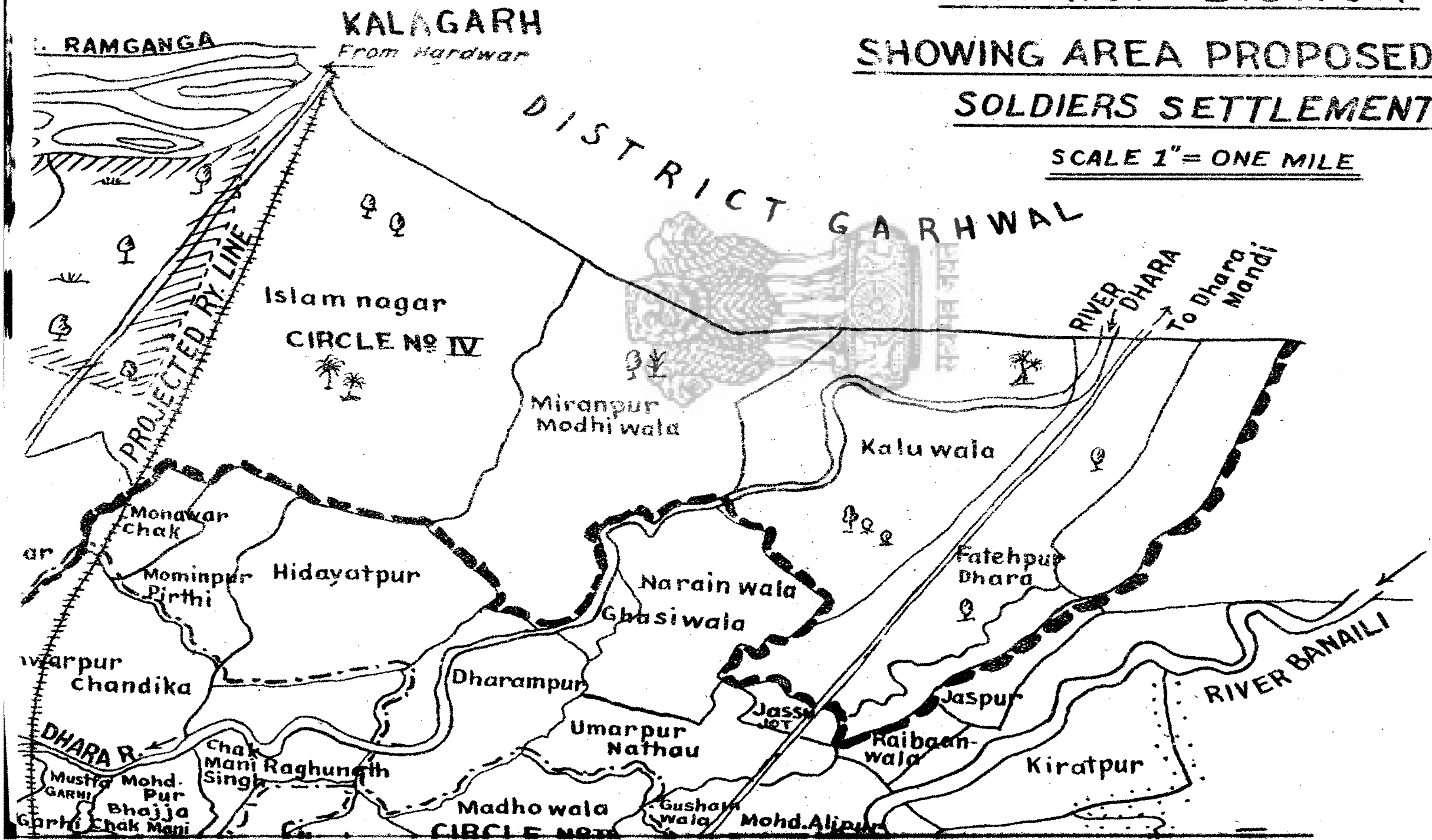
सत्यमेव जयते

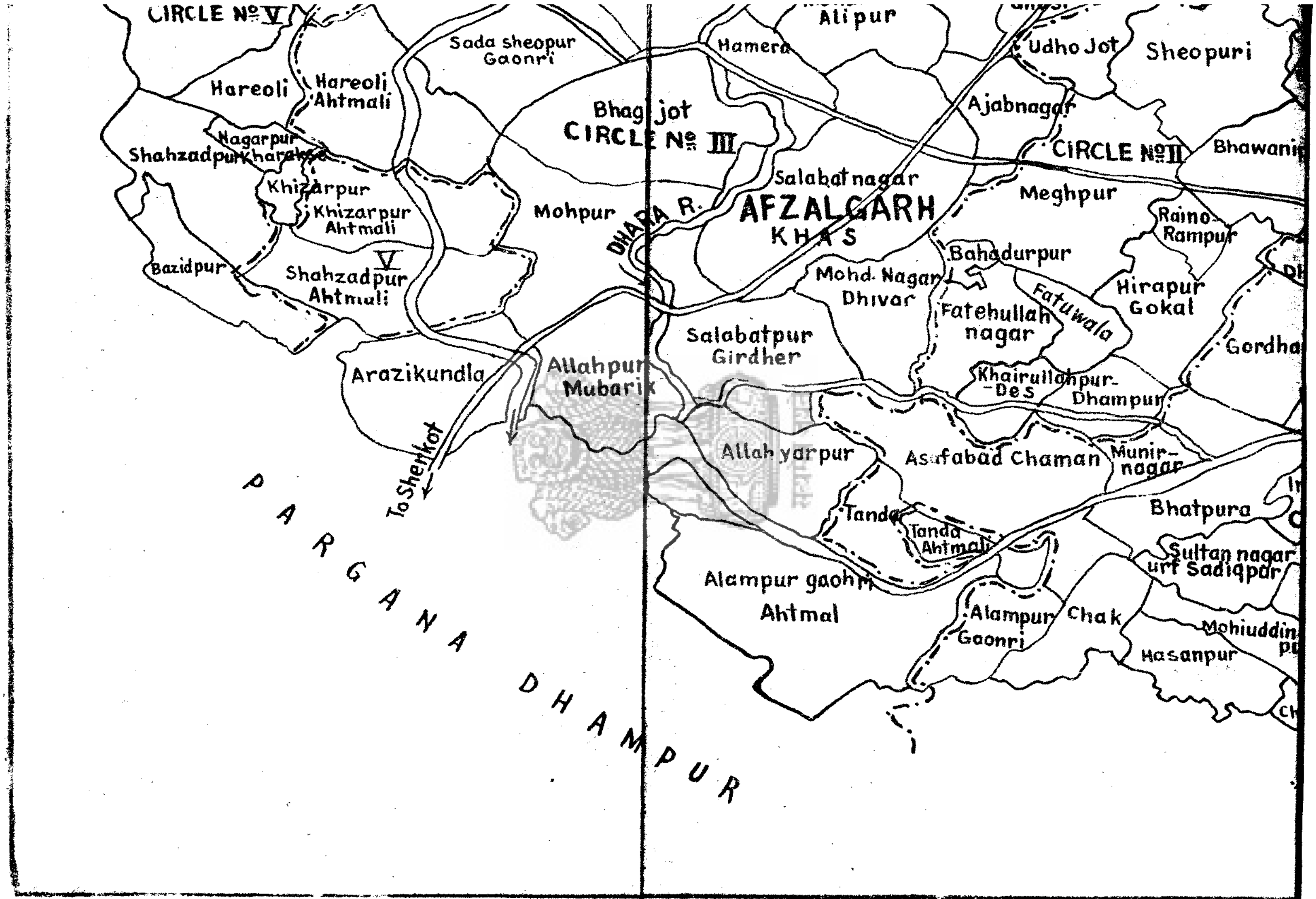

To Burhapura
PARGANA BURHAPURA
W
N
E
Hareola
Mian Bhaipur
Hareola-Ahtmali
RAM GANGA R.
Jamanpur
Shahjahanpur
Afzalpur hari
Tajganj
Naubad
Fateh Ali purpan
Morjhari
Moh. Nagar
Aghwanpur
Afzalgarh Garhi
Goonri
Momin nagar
Azimullah nag
Paiwand Khari
Kesri
Turatpur
Nawab pura
Gularwali
THICK FOREST
BAOLI

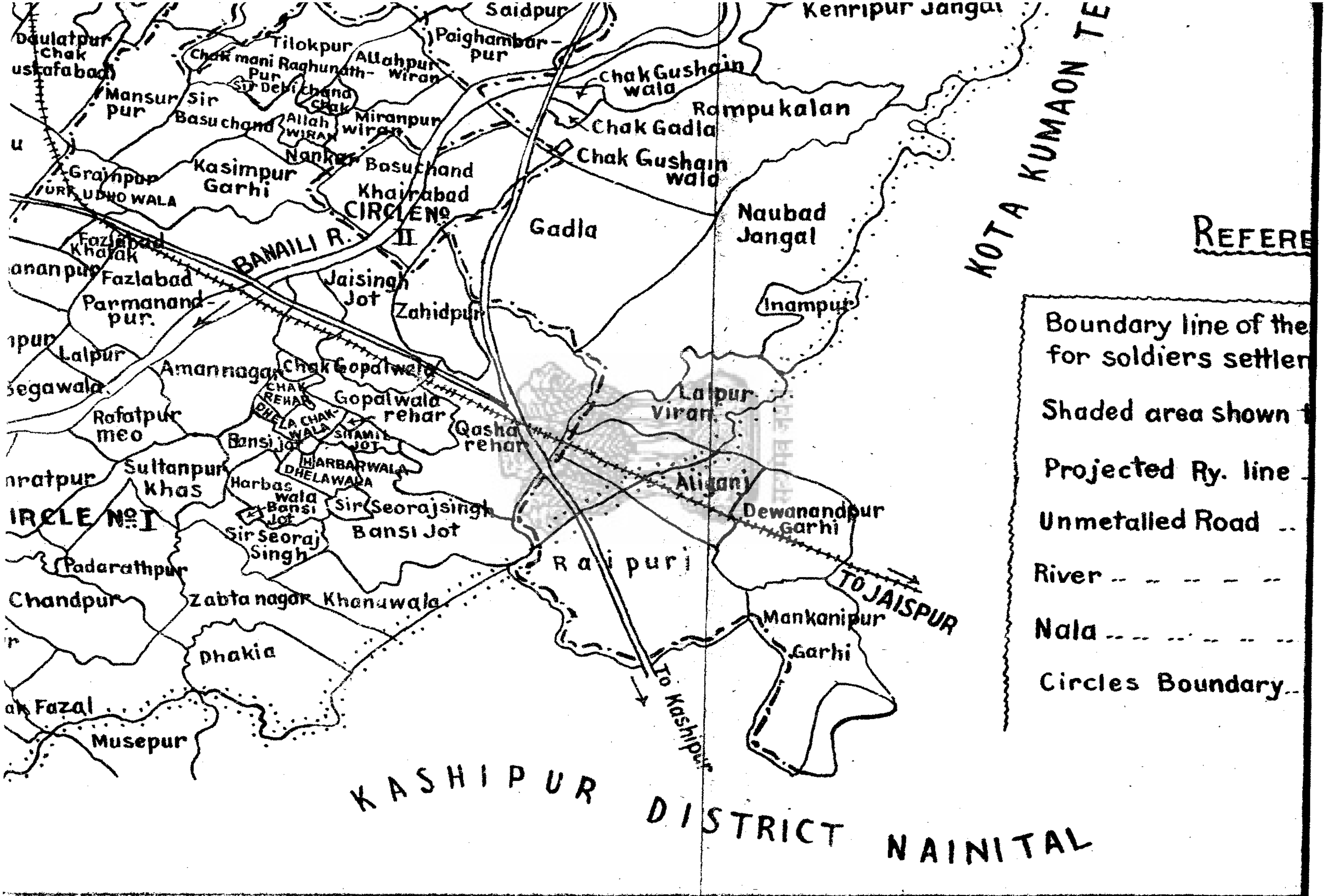
APPENDIX A

MAP OF
PARGANA AFZALGARH
DISTRICT BIJNOR
SHOWING AREA PROPOSED FOR SOLDIERS SETTLEMENT

SCALE 1" = ONE MILE




CIRCLE No. V
Sada sheopur Gaonri
Hamera
Alipur
Udho Jot
Sheopuri
Hareoli
Hareoli Ahtmali
Bhagjot
CIRCLE No. III
Ajabnagar
CIRCLE No. II
Bhawani
Nagarpur
Shahzadpur Kharakhe
Khizarpur
Khizarpur Ahtmali
Mohpur
Salabatnagar
AFZALGARH KHAS
Meghpur
Raino-Rampur
DHARA R.
Bazidpur
V
Shahzadpur Ahtmali
Mohd. Nagar Dhivar
Bahadurpur
Fatuwala
Hirapur Gokal
Fatehullah nagar
Salabatpur Girdher
Gordha
Arazikundla
Allahpur Mubarik
Khairullahpur-Des
Dhampur
Allah yarpur
Asafabad Chaman
Munir-nagar
To Sherkot
Tanda
Tanda Ahtmali
Bhatpura
Sultan nagar urf Sadiqpur
PARGANA DHAMPUR
Alampur gaohri
Ahtmal
Alampur Gaonri
Chak
Mohiuddin
Hasanpur


Daulatpur
Chak
Mustafabad
Mansur pur
Sir Basuchand
Tilokpur
Chak mani Raghunath-pur
Sir Debi chand
Chak
Allah wiran
Allahpur wiran
Miranpur wiran
Saidpur
Paighambar-pur
Kenripur Jangal
Chak Gushain wala
Rampukalan
Chak Gadla
Chak Gushain wala
Grainpur
URF UDHO WALA
Kasimpur Garhi
Nankar
Basuchand
Khairabad
CIRCLE No II
BANAILI R.
Gadla
Naubad Jangal
KOTA KUMAON TE
Fazlabad Khatak
anandpur
Fazlabad
Parmanand-pur
Jaisingh Jot
Zahidpur
Inampur
pur
Lalpur
Amannagar
Chak Gopalwala
Segawala
CHAK REHAR
Gopalwala rehar
Rafatpur meo
DHELA CHAK-WALA
SHAMI JOT
Qasha rehar
Lalpur Viran
Bansi jot
HARBARWALA
DHELAWALA
Sultanpur khas
Aliganj
Harbas wala
Sir Seorajsingh
Dewanandpur Garhi
nratpur
Bansi Jot
CIRCLE No I
Sir Seoraj Singh
Bansi Jot
Padarathpur
Raipuri
TO JAISPUR
Chandpur
Zabtanagar
Khanuwala
Mankanipur
Garhi
r
Dhakia
To Kashipur
ak Fazal
Musepur
KASHIPUR DISTRICT NAINITAL
REFERE
Boundary line of the
for soldiers settler
Shaded area shown
Projected Ry. line
Unmetalled Road
River
Nala
Circles Boundary

.NCES

area propsed
nent.. .. .. ..

hick Forest.. ..

Circle V

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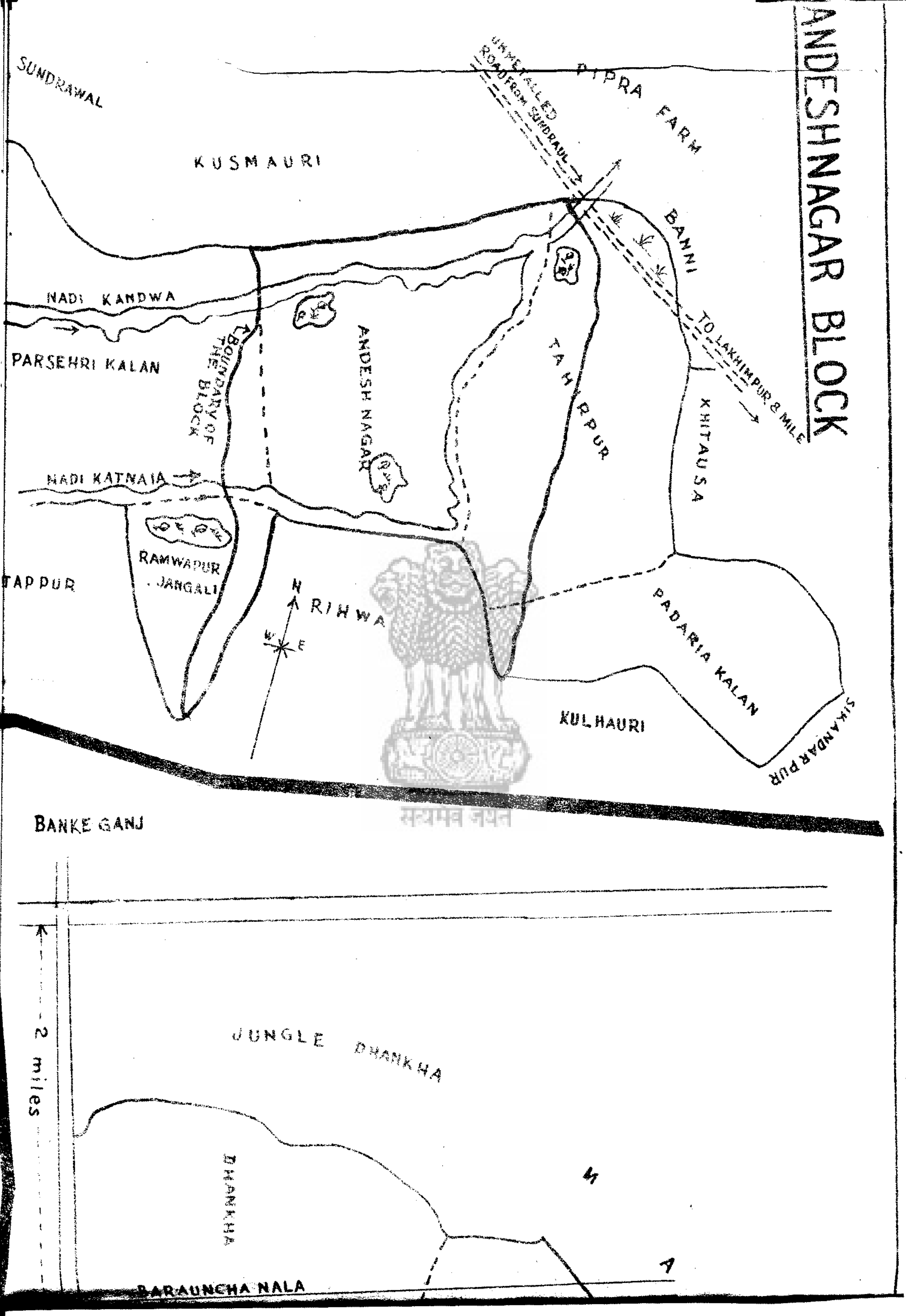
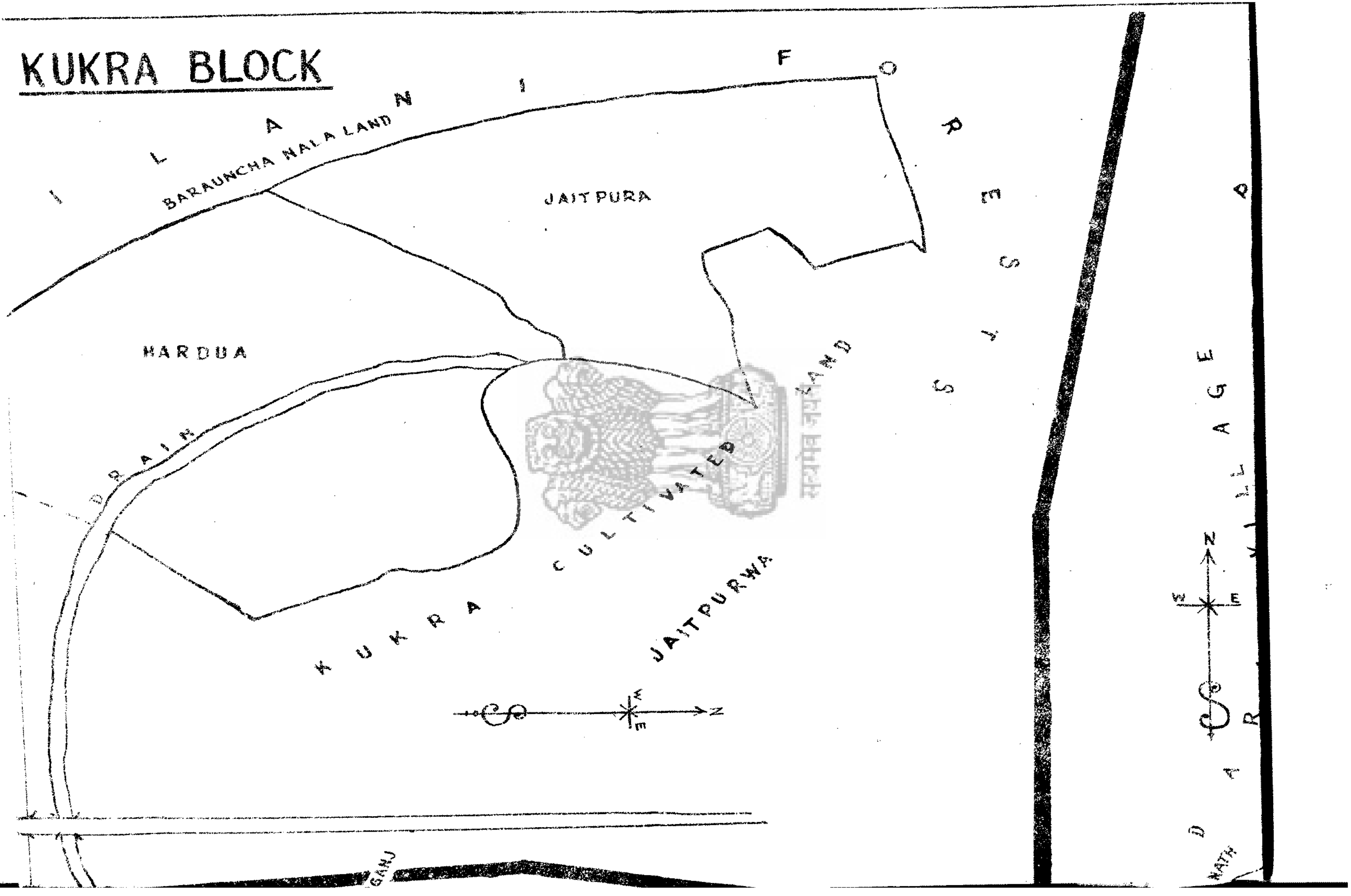
P. S. U. P. (R) I. R. D. 1947, 3200

ANDESHNAGAR BLOCK

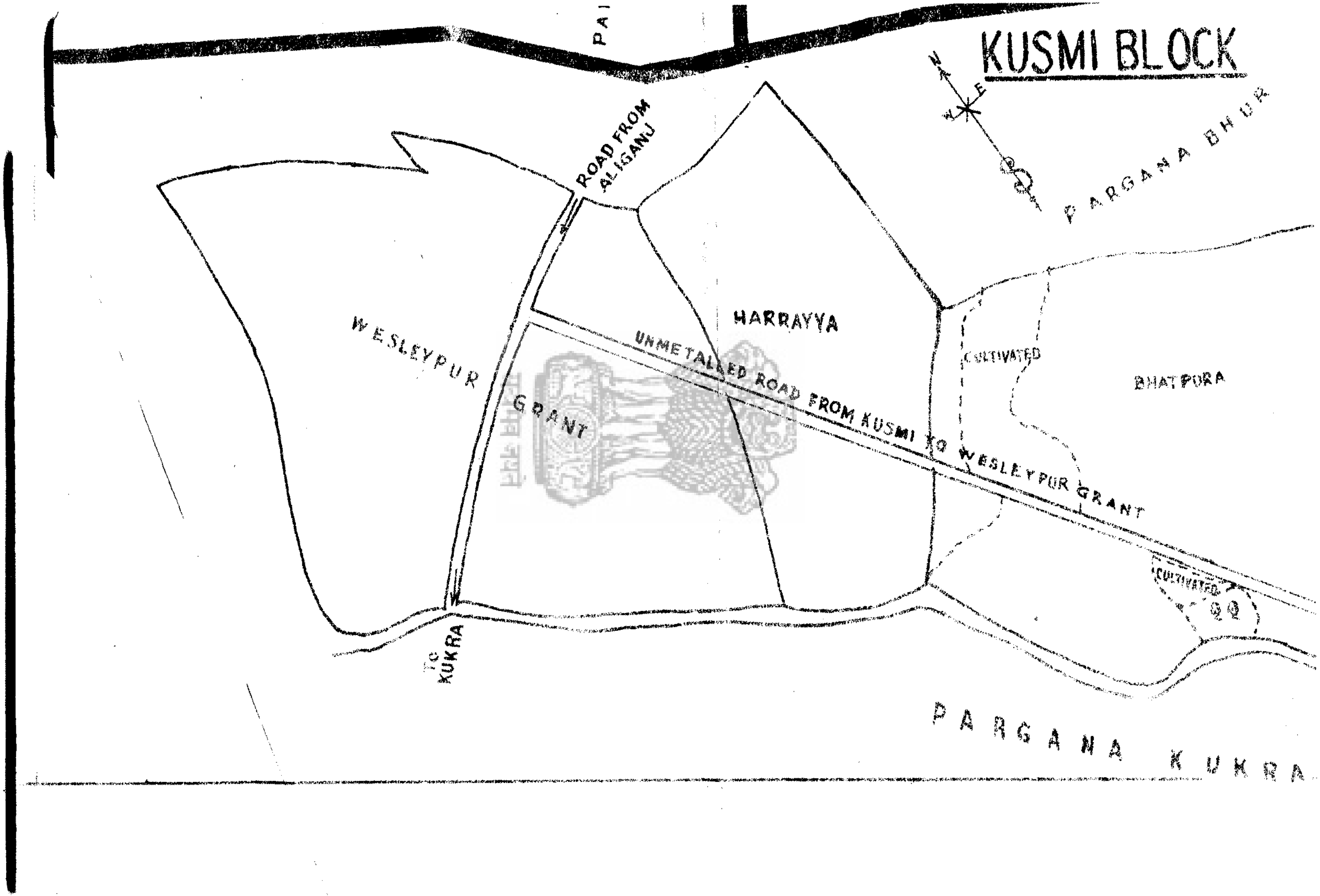


सत्यमेव जयते

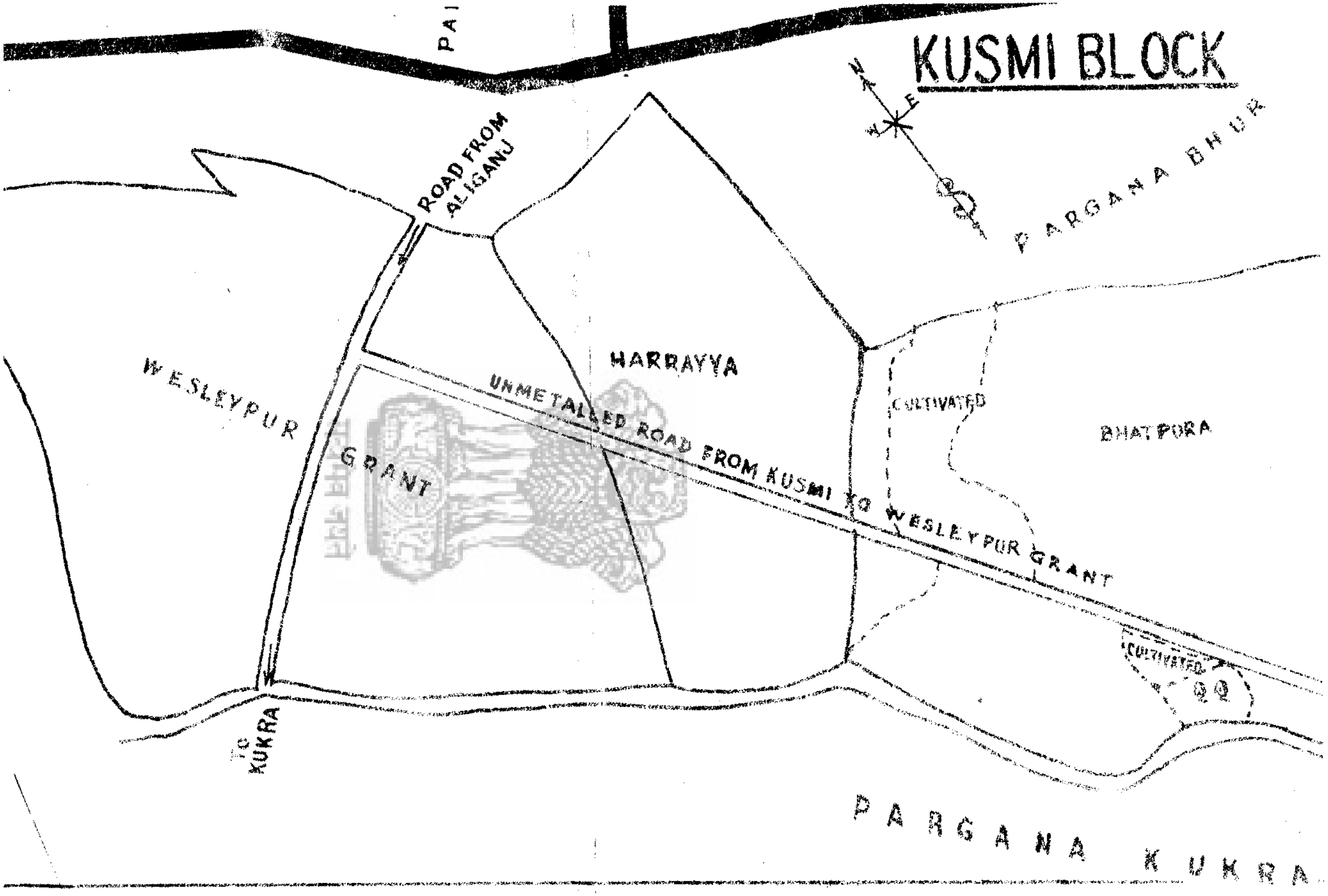
KUKRA BLOCK

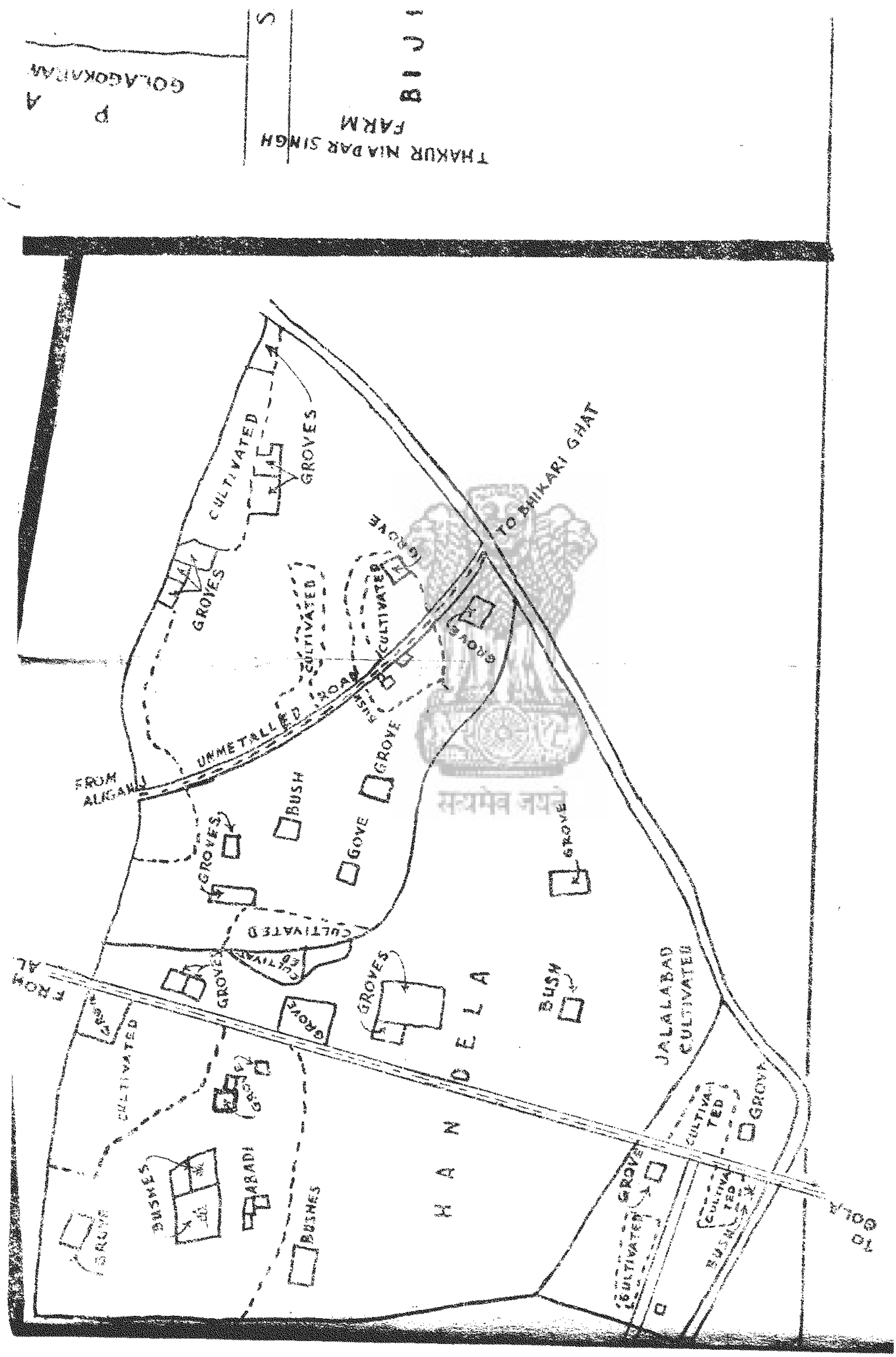

ILAANI FOREST
BARAUNCHA NALA LAND
JAITPURA
HARDUA
DRAIN
KUKRA CULTIVATED LAND
JAITPURWA
GANJ
NATH
DARA VILLAGE
N
W
E
N
E

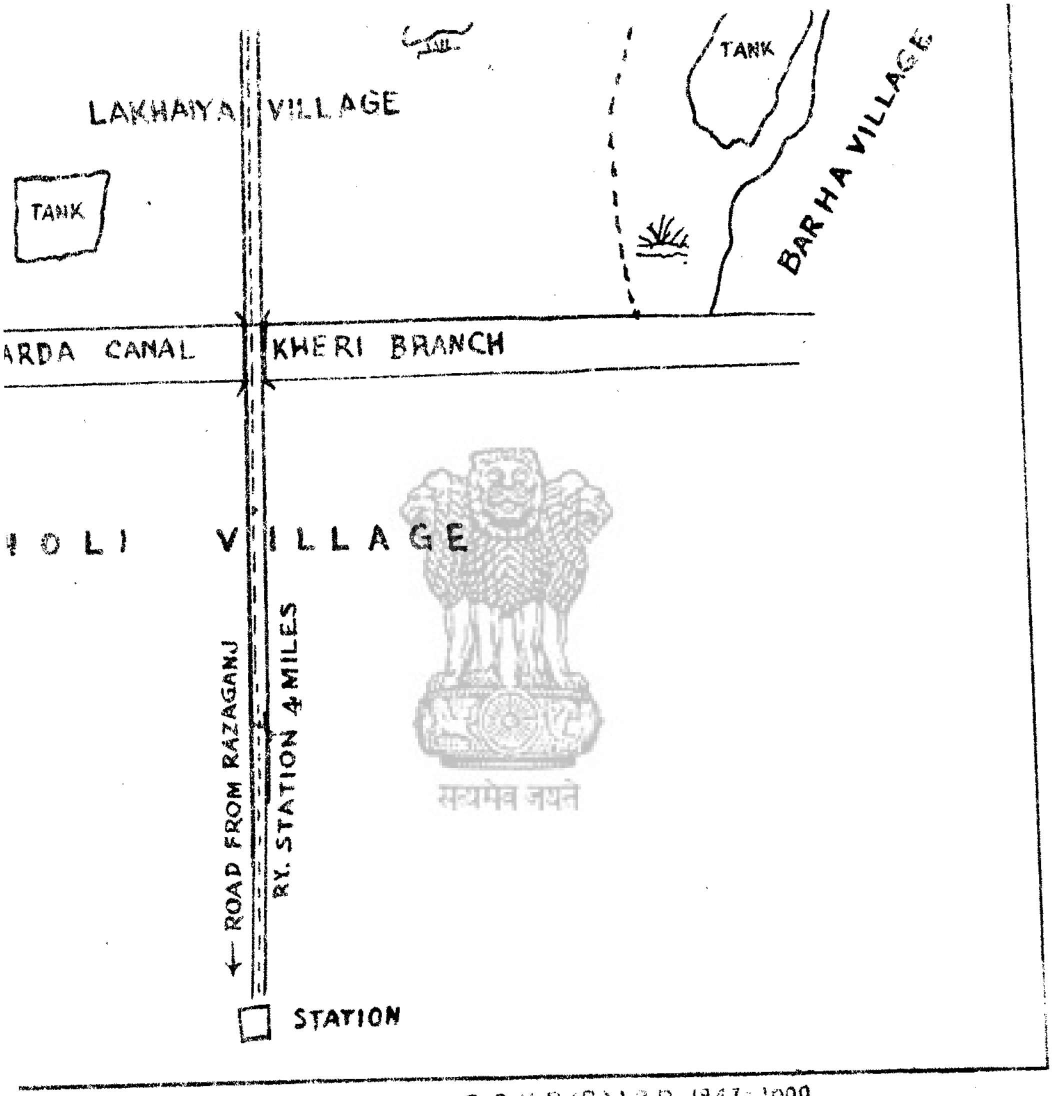
KUSMI BLOCK



N
E
W
PARGANA BHUR
PAI
ROAD FROM ALIGANJ
HARRAYYA
CULTIVATED
BHATPURA
UNMETALLED ROAD FROM KUSMI TO WESLEYPUR GRANT
WESLEYPUR GRANT
CULTIVATED
TO KUKRA
PARGANA KUKRA


KUSMI BLOCK
N
E
W
PARGANA BHUR
PA
ROAD FROM ALIGANJ
HARRAYYA
WESLEYPUR GRANT
UNMETALLED ROAD FROM KUSMI TO WESLEYPUR GRANT
CULTIVATED
BHATPURA
CULTIVATED
TO KUKRA
PARGANA KUKRA


P A
GOLAGOKARAN
S
B I J I
THAKUR NIADAR SINGH FARM
TO BHIKARI GHAT
CULTIVATED
GROVES
GROVES
GROVES
GROVE
CULTIVATED
CULTIVATED
GROVE
UNMETALLED ROAD
FROM ALIGANJ
BUSH
GROVE
BUSH
GROVES
GOVE
GROVE
GROVES
CULTIVATED
CULTIVATED
GROVE
GROVE
GROVES
K H A N D E L A
BUSH
JALALABAD CULTIVATED
FROM AL
GROVE
CULTIVATED
GROVE
ABADI
BUSHES
BUSHES
GROVE
CULTIVATED
GROVE
CULTIVATED
CULTIVATED
CULTIVATED
BUSH
GROVE
TO GOLA
सत्यमेव जयते



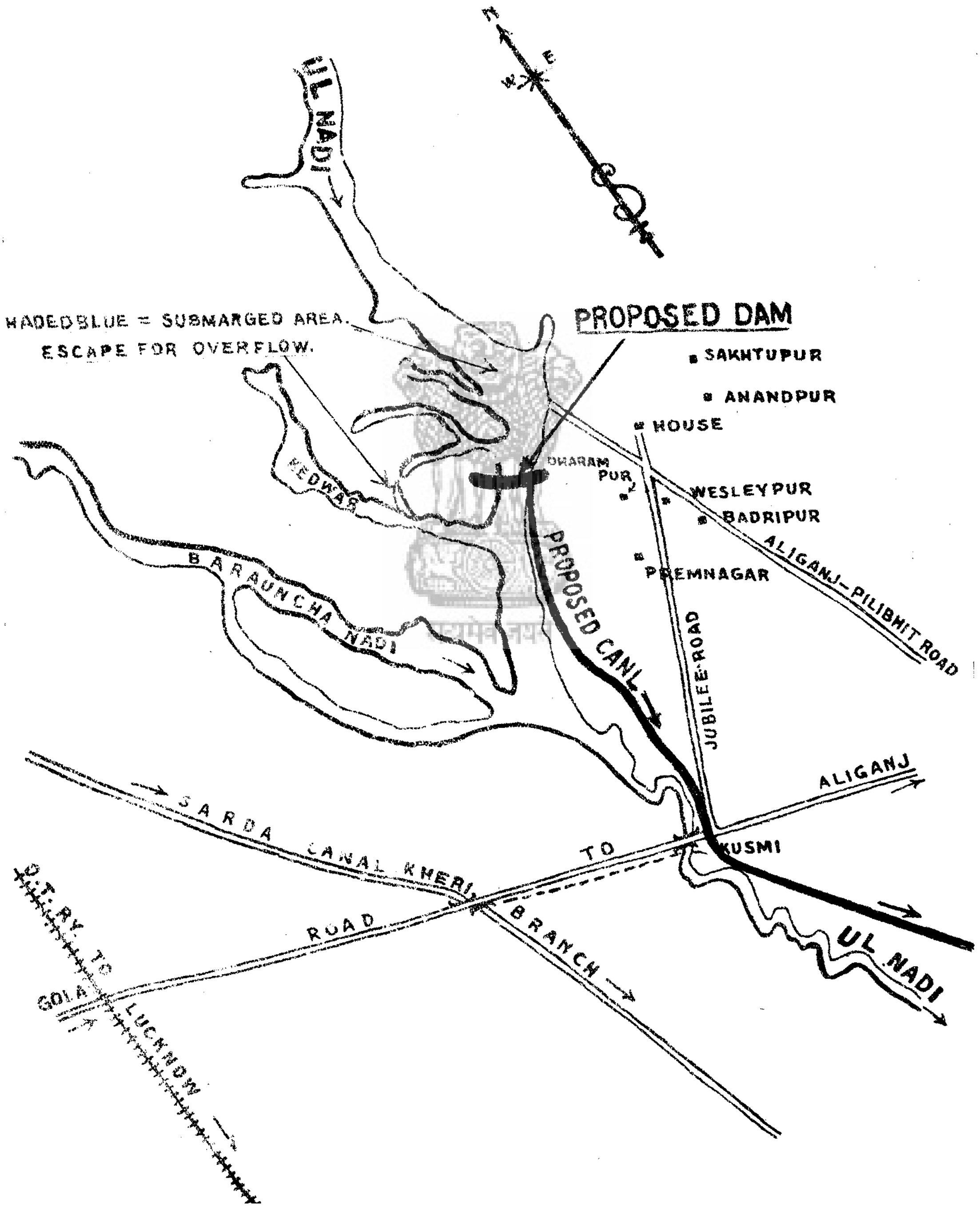
सत्यमेव जयते

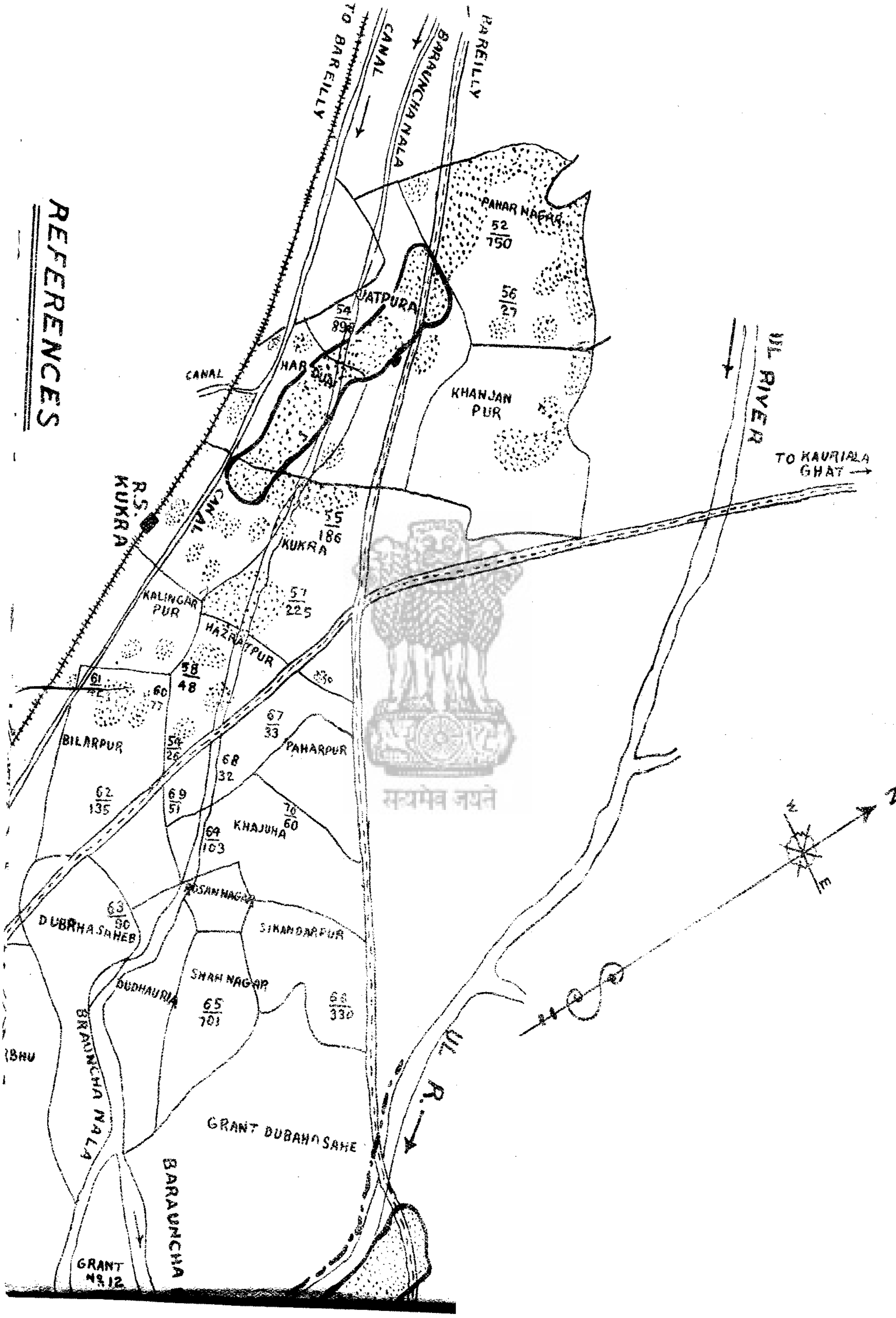
P. S. U. P. (R) 1 B.D. 1947—1000.

APPENDIX C.

PROPOSED DAM & CANAL.
NEAR WESLEYPUR GRNT
DISTRICT LAKHIMPUR KHERI

Scale 1 inch=1 mile



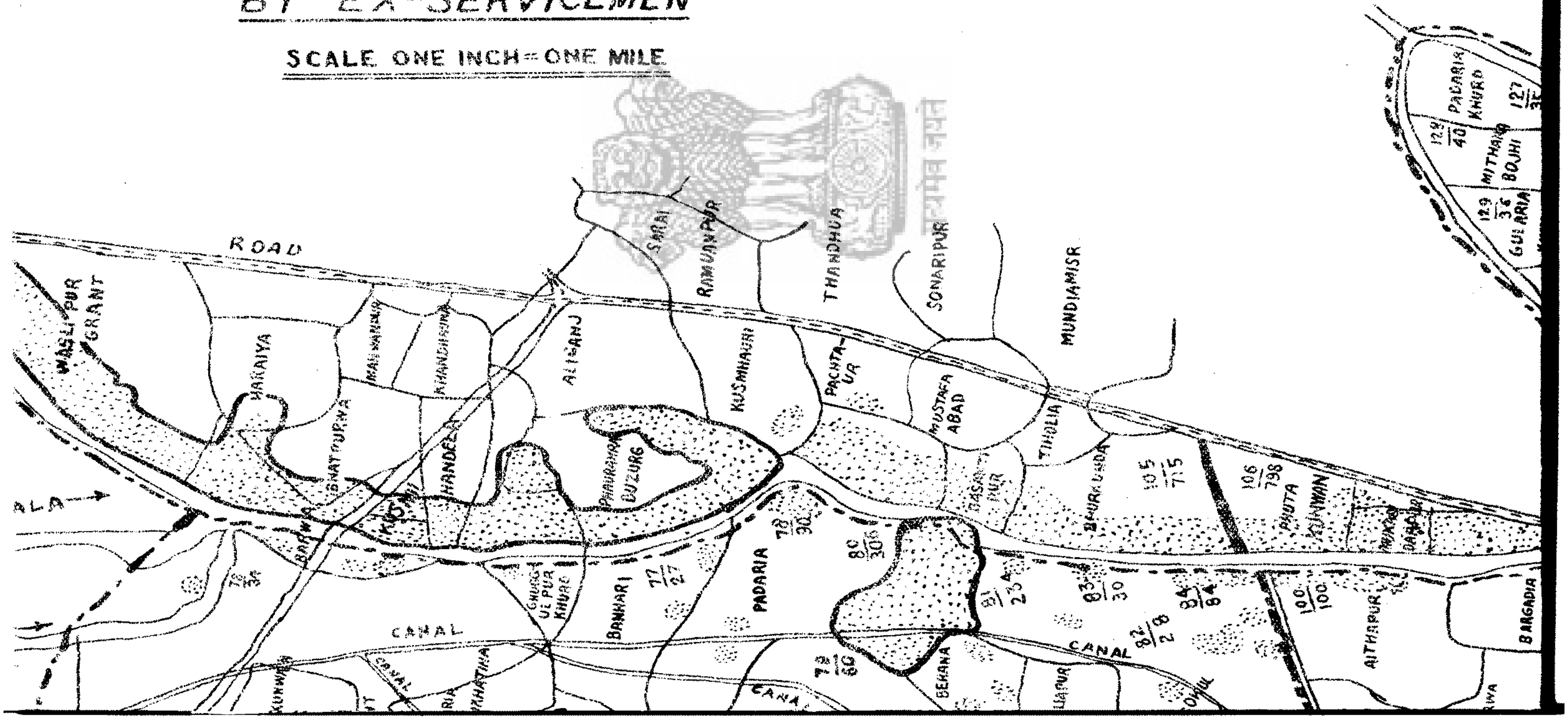

REFERENCES
TO BAREILLY
CANAL
BARAUNCHA NALA
BAREILLY
PAHAR NAGAR
52/750
56/27
JATPURA
54/898
HAR DUI
CANAL
KHANJAN PUR
UL RIVER
TO KAURIALA GHAT →
R.S. KUKRA
CANAL
55/186
KUKRA
KALINGAR PUR
57/225
HAZRATPUR
58/48
61
60/77
330
BILARPUR
54/26
67/33
PAHARPUR
68/32
69/51
62/135
70/60
KHAJUHA
64/103
ROSAN NAGAR
63/80
DUBRHA SAHEB
SIKANDARPUR
SHAH NAGAR
DUDHAURIA
65/101
66/330
BRAUNCHA NALA
RBHU
GRANT DUBAHO SAHE
UL R.
BARAUNCHA
GRANT No 12
N
W
E

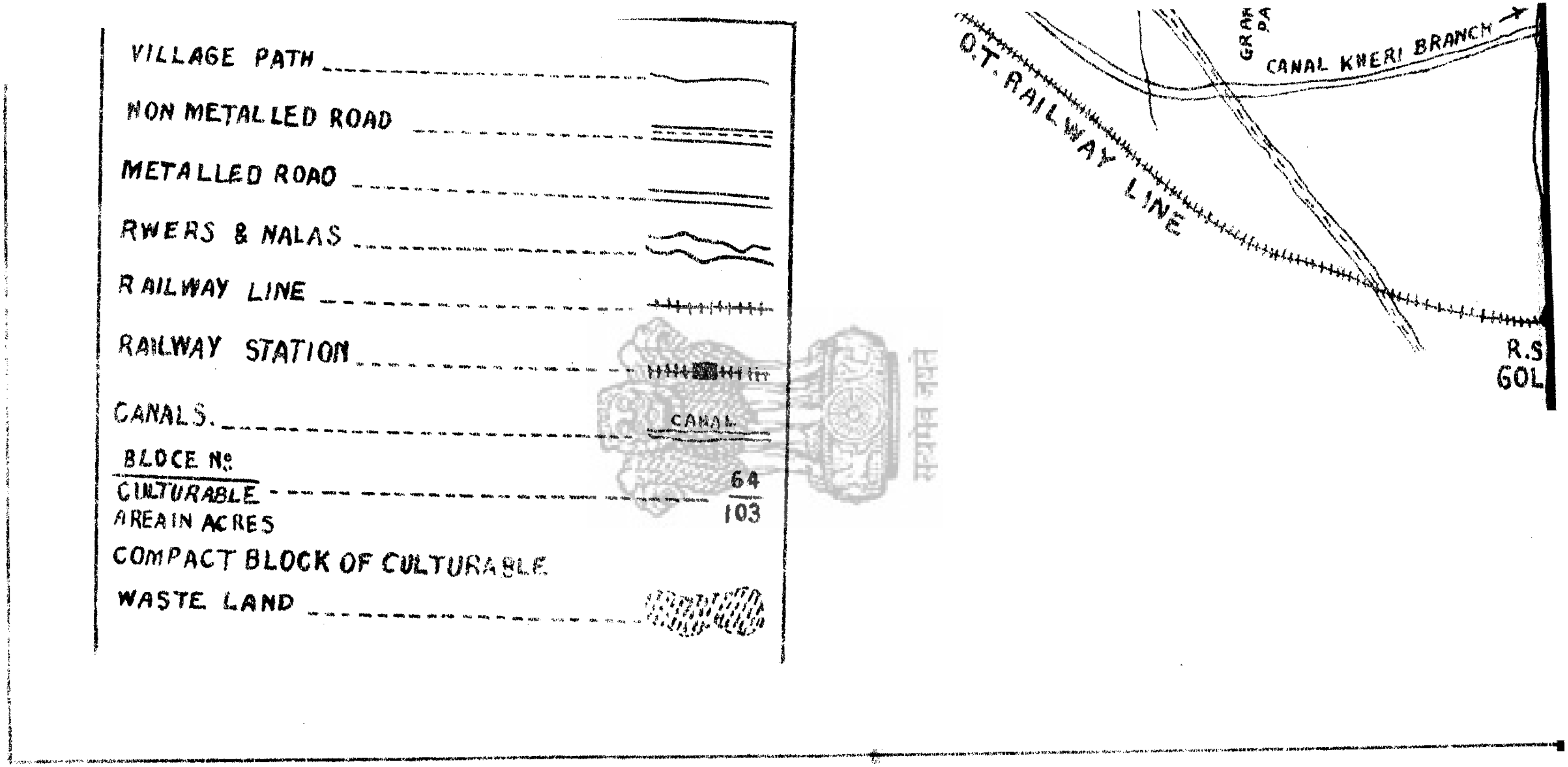
सत्यमेव जयते

APPENDIX A

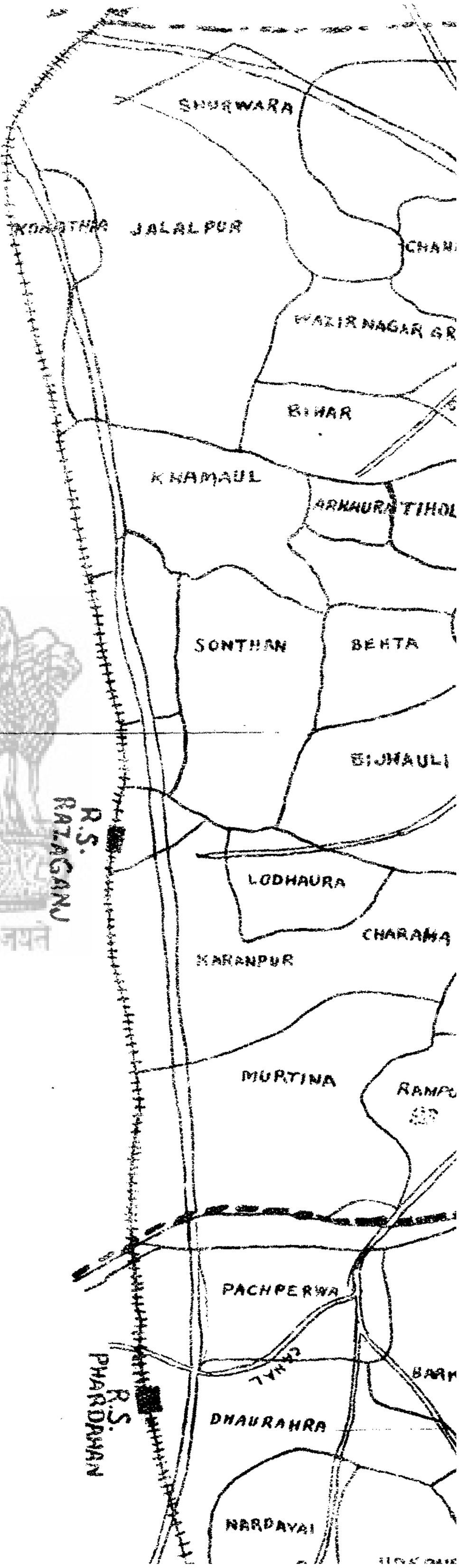
SECTION OF TAHSIL
LAKHIMPUR-KHERI
CONTAINING BLOCKS OF CULTURABLE WASTE SELECTED FOR SETTLEMENT BY EX-SERVICEMEN

SCALE ONE INCH = ONE MILE

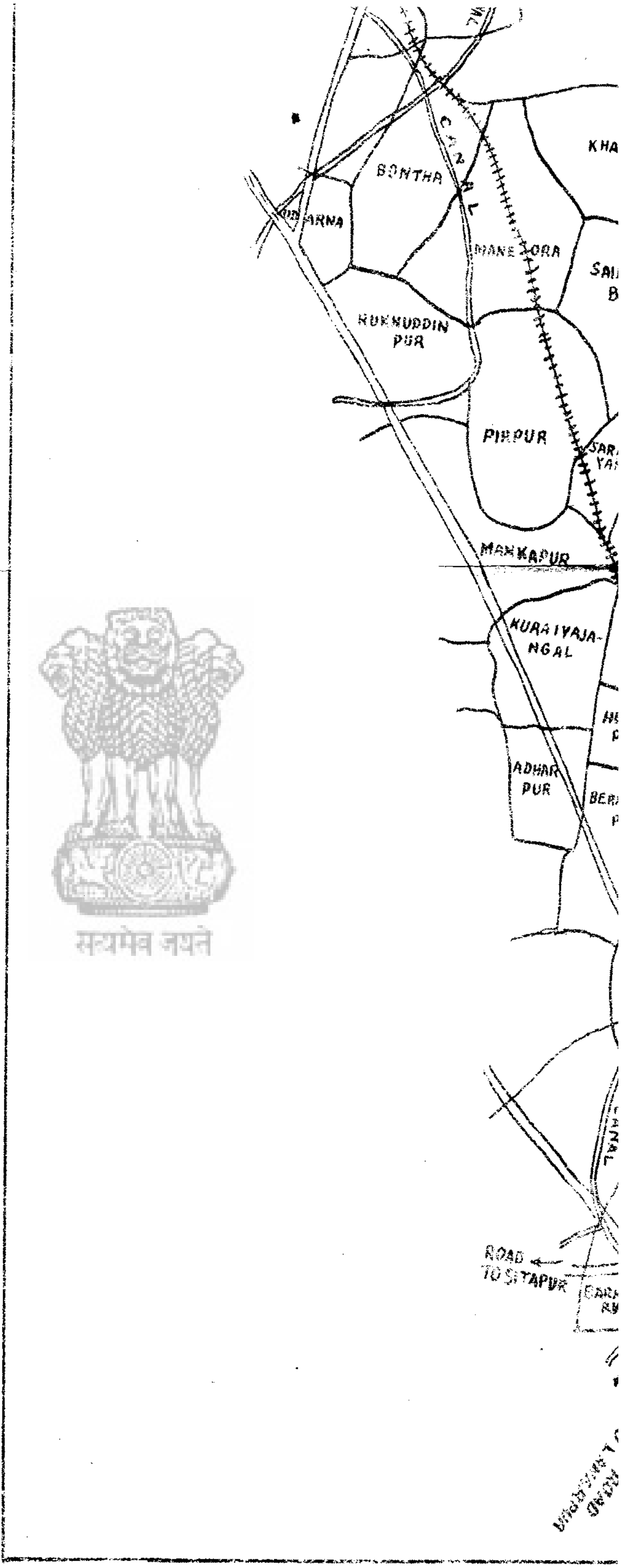



VILLAGE PATH
NON METALLED ROAD
METALLED ROAD
RWERS & NALAS
RAILWAY LINE
RAILWAY STATION
CANALS.
CANAL
BLOCE No
CULTURABLE AREA IN ACRES
64
103
COMPACT BLOCK OF CULTURABLE WASTE LAND
O.T. RAILWAY LINE
GRAN
PA
CANAL KHERI BRANCH
R.S
GOL

सत्यमेव जयते

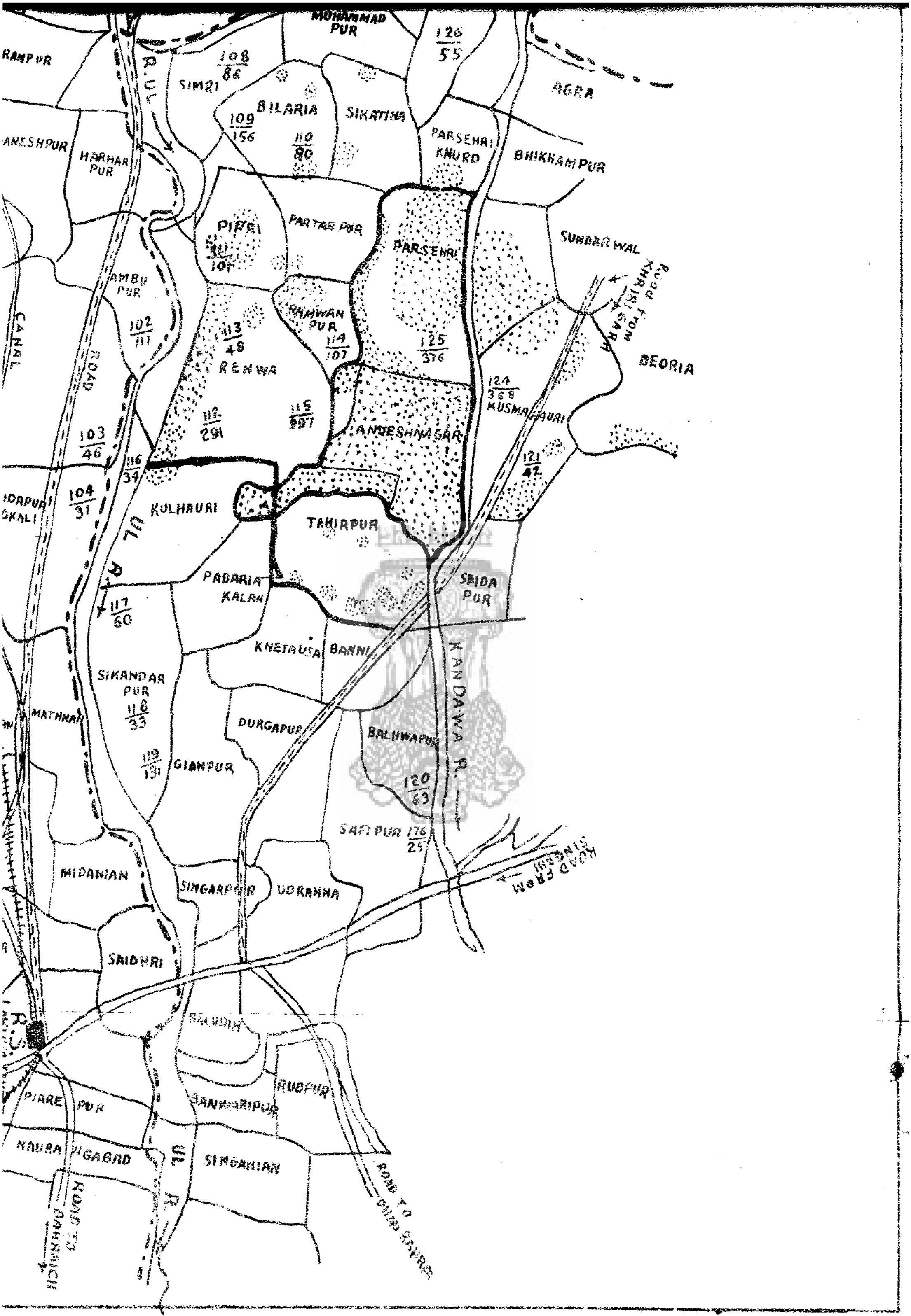

SHURWARA
CHAN
KOHATHA
JALALPUR
CHAN
WAZIR NAGAR GR
BIHAR
KHAMAUL
ARHAURA
TIHOL
SONTHAN
BEHTA
BIJHAULI
R.S. RAJAGANJ
LODHAURA
CHARAMA
KARANPUR
MURTINA
RAMPU
PACHPERWA
CANAL
BARH
R.S. PHARDAHAN
DHAURAHRA
NARDAYAI

सत्यमेव जयते



P.S.U.P.—831 R.D. 1947-1000.

सत्यमेव जयते


MOHAMMAD PUR
126/55
RANPUR
R. UL
108/86
SIMRI
AGRA
109/156
BILARIA
SIKATHA
110/80
ANESHPUR
HARHAR PUR
PARSEHRI KHURD
BHIKHAMPUR
PIPRI
101/101
PARTAB PUR
PARSEHRI
SUNDAR WAL
Road from KHRIRI GARH
AMBU PUR
CANAL
ROAD
102/111
113/48
REHWA
RAHWAN PUR
114/107
125/376
BEORIA
124/368
KUSMAHAURI
103/46
112/291
115/997
ANDESHNAGAR
121/42
116/34
IDAPUR
104/31
KULHAURI
TAHIRPUR
UL R.
PADARIA KALAN
117/60
SRIDA PUR
KHETAUSA
BARNI
SIKANDAR PUR
118/33
MATHNAN
DURGAPUR
BALHWAPUR
KANDAWA R.
119/131
GIANPUR
120/63
SAFIPUR 176/25
ROAD FROM SINGHI
MIDANIAN
SINGARPUR
UDRANNA
SAIDHRI
R.S.
BAUDIN
PIARE PUR
BANWARIPUR
RUDPUR
NAURA NGABAD
UL R.
SINGAHIAN
ROAD TO BAHRAICH
ROAD TO BIRD RAHRA

APPENDIX VII

Tube-Well Circle, Irrig

Estimate for type 1·5 cubics tube-well with

Description	Well no.	Q—Equipments									B—Land	
		Work charged establishment	Boring	Transport	Blind pipe	Strainer	Total Tube	Plant and accessories	Total—Equipment	A—Preliminary	Permanent land	Temporary land
1	2	3	4	5	6	7	8	9	10	11	12	13
Unit	No.	No.	Feet	Job	Feet	Feet	..	..	..	No.	Acre	Acre
Quantity	1	1½	300	1	200	100	..	1	..	1	2	3
Rate	..	60	4/—	200	5/—	18	..	2,729	..	20	300	36
Amount Rs.	..	90	1,200	1,200	1,000	1,800	4,290	2,730	7,020	20	600	108
Contingencies 5 per cent. ..	..	5	60	10	50	90	214	136	351	1	30	5
Total amount ..	..	95	210	210	1,050	1,890	4,504	2,866	7,371	21	630	113

Abstra

A—Preliminary

B—Land ..

C—Works ..

Q—Equipment

Total

I (D)

ation Works

horizontal pump with pipe line

Civil works							Syphons							
Sump and pump house	Boundary stones	Pipe line complete	Line channel	Head sump	Inter sump	End sump	Service roads	Unlined channels	Metalled road	Unmetalled road	Service road	Work charged establishment.	Total, C Works	Remarks
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
No.	No.	No.	Mile	No.	No.	No.	M	M	No.	No.	No.	No.	..	
1	4	518	½	1	½	1½	1·25	2·5	·1	3	4	2	..	
2,200	5	8,800	5,600	650	360	100	350	640	400	150	100	60	..	
2,200	20	5,500	700	650	120	150	450	1,600	40	450	400	120	12,400	
110	1	275	35	33	6	7	23	80	2	22	20	6	620	
2,310	21	5,775	735	683	126	157	472	1,680	42	472	420	126	13,020	

t

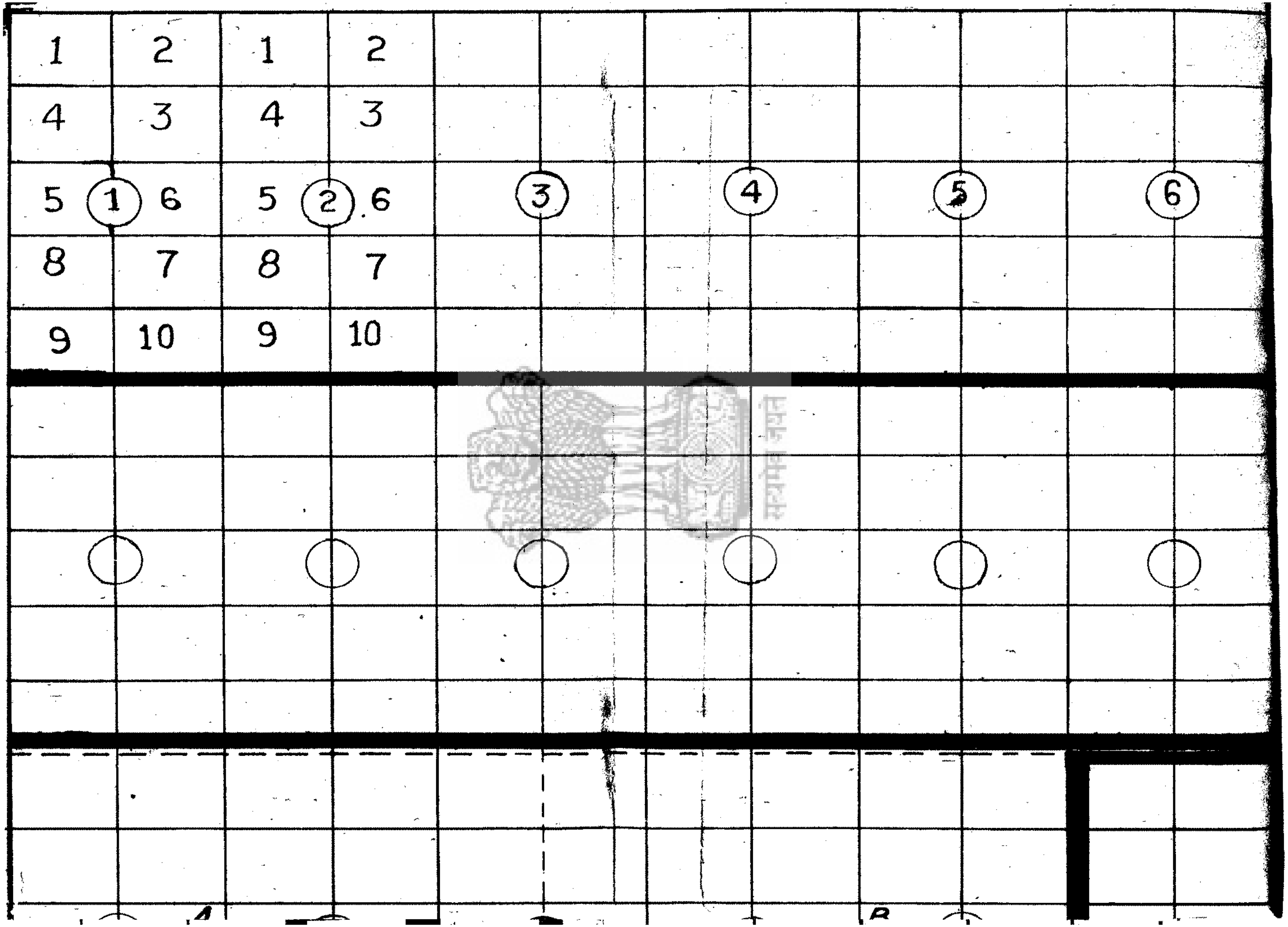
.. 21

.. 743

.. 13,020

.. 7,371

.. 21,155


①
②
③
④
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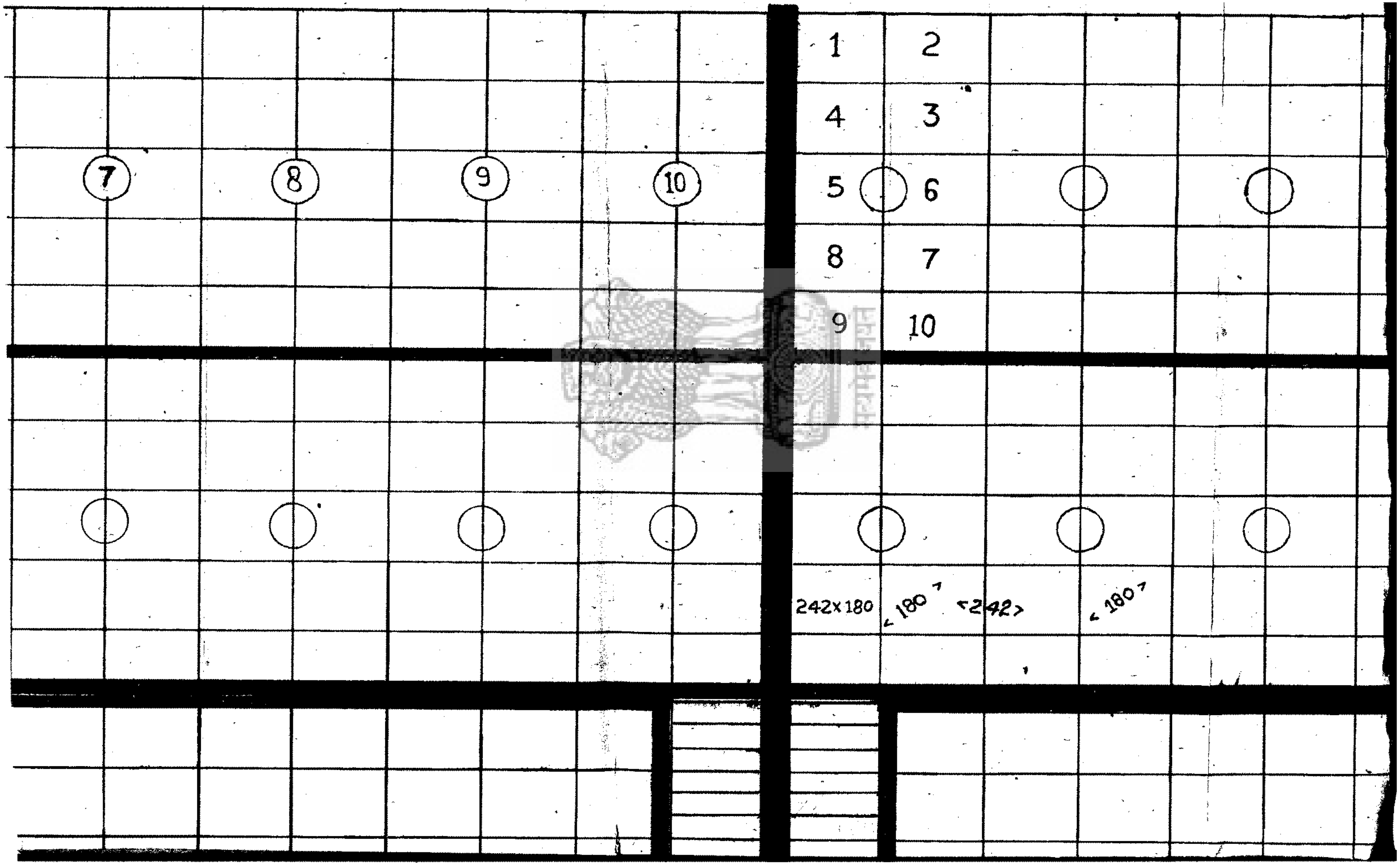
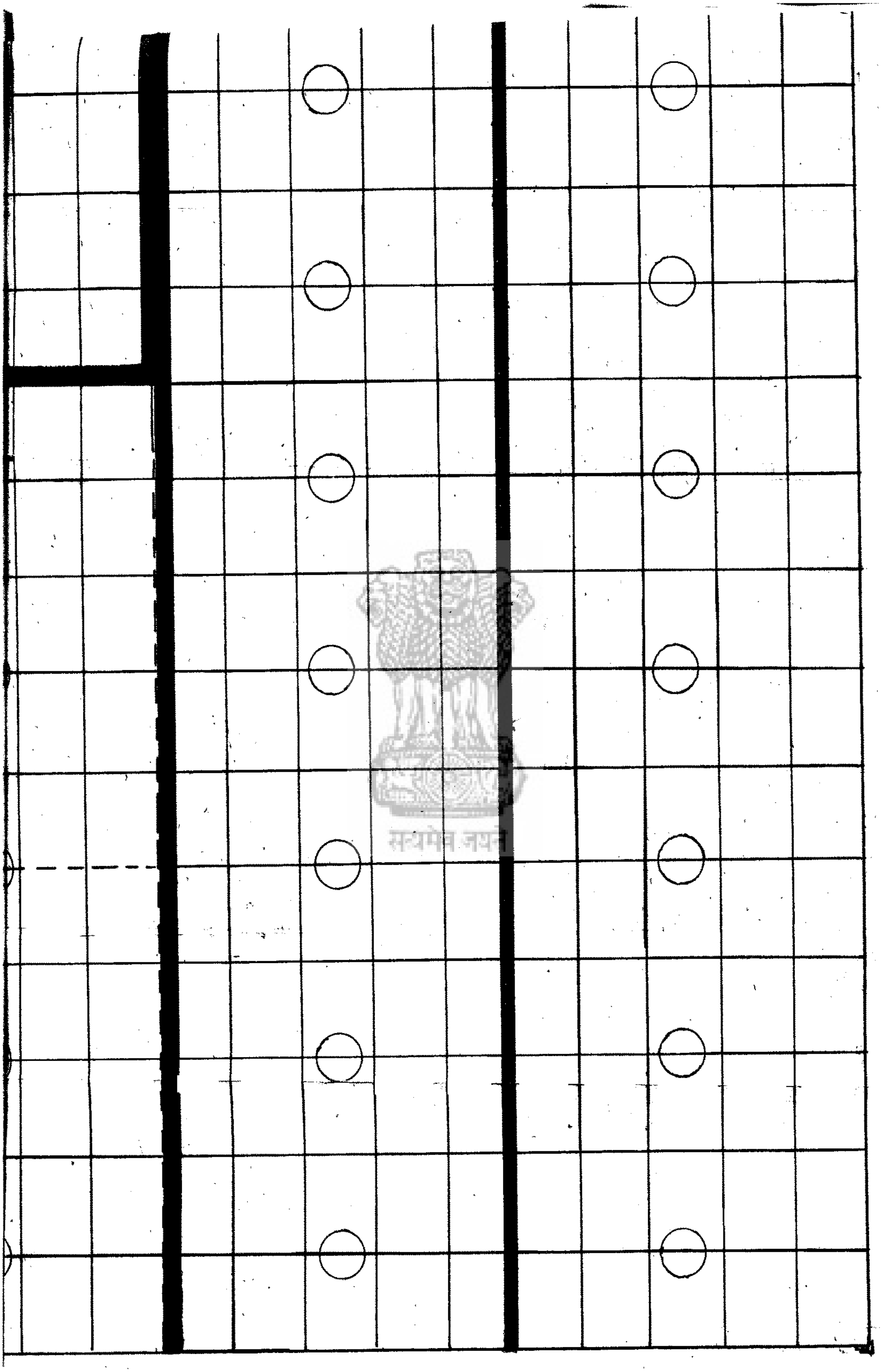
⑥
A
B

ANNEXURE II

MAP FOR A FARM OF 1,000 ACRES





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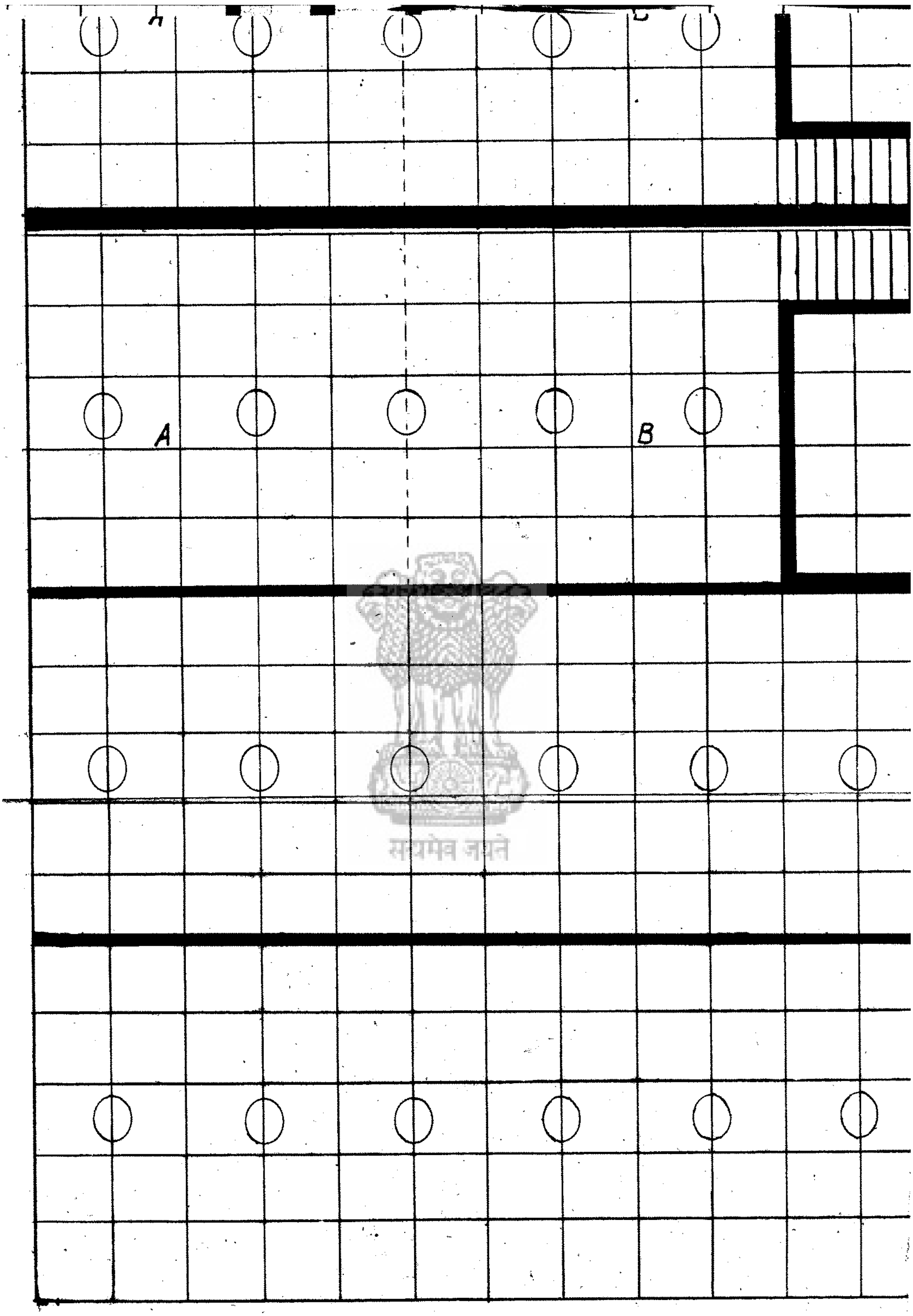

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N.B. 1.

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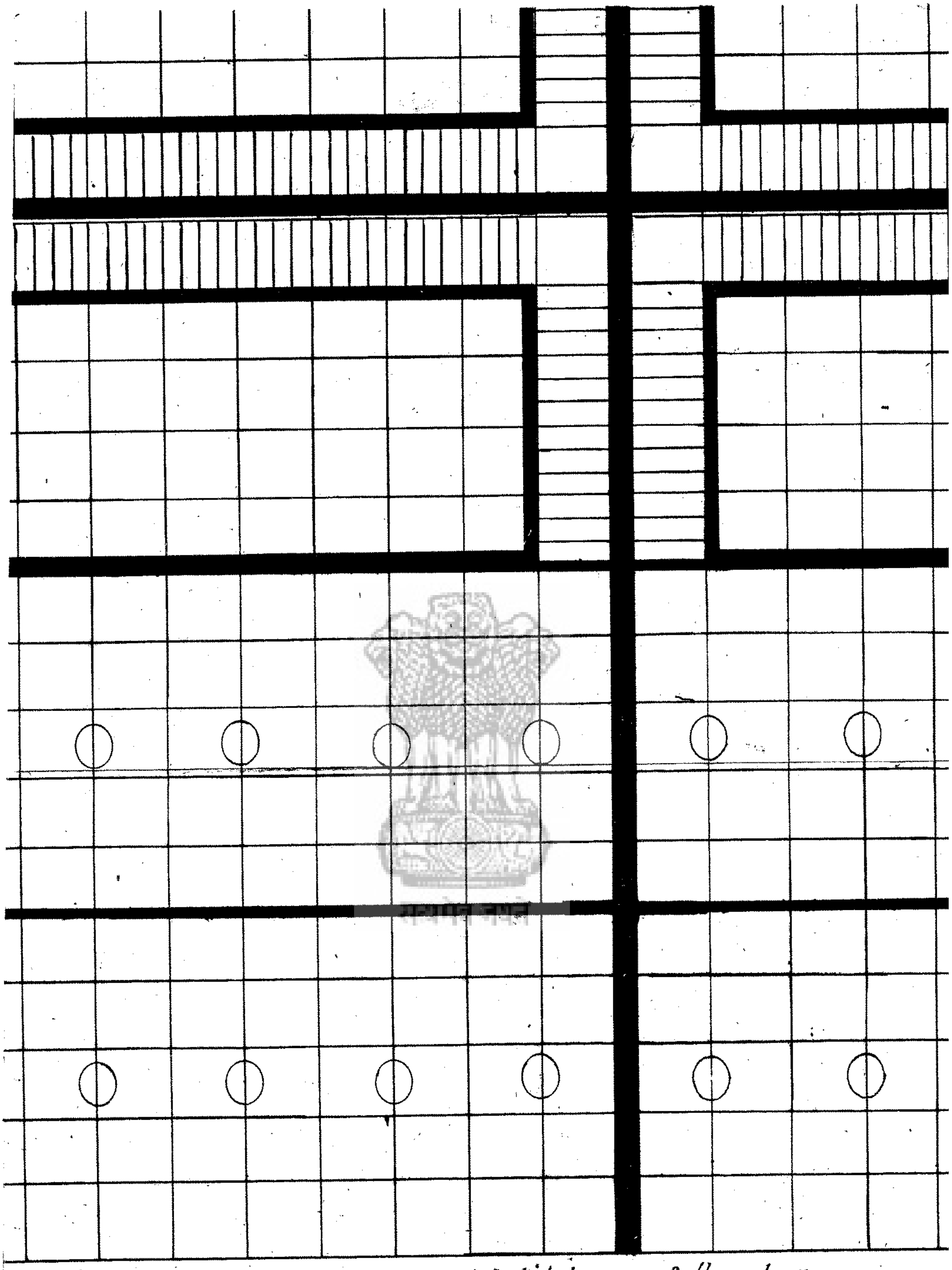
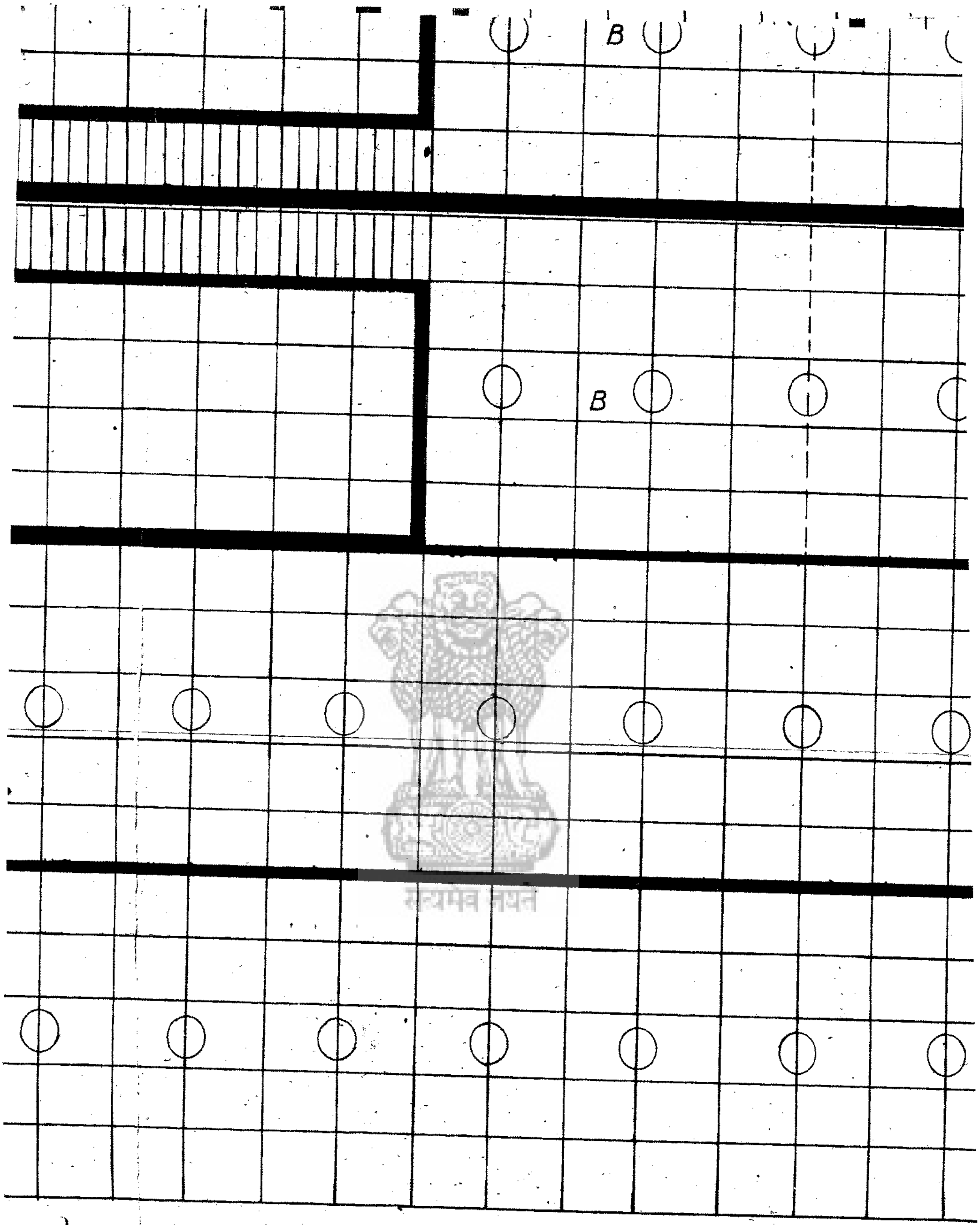


Block surrounded by blue pencil represent inhabited area of the colony.
The central portions marked with blue ink (A) represent grazing grounds and (B), the o
Block of cultivated area are in the north and south of the central strip of 400 acres each
For co-operative farm the cultivated block is divisible in 80 holdings of 10 acres each and for sta



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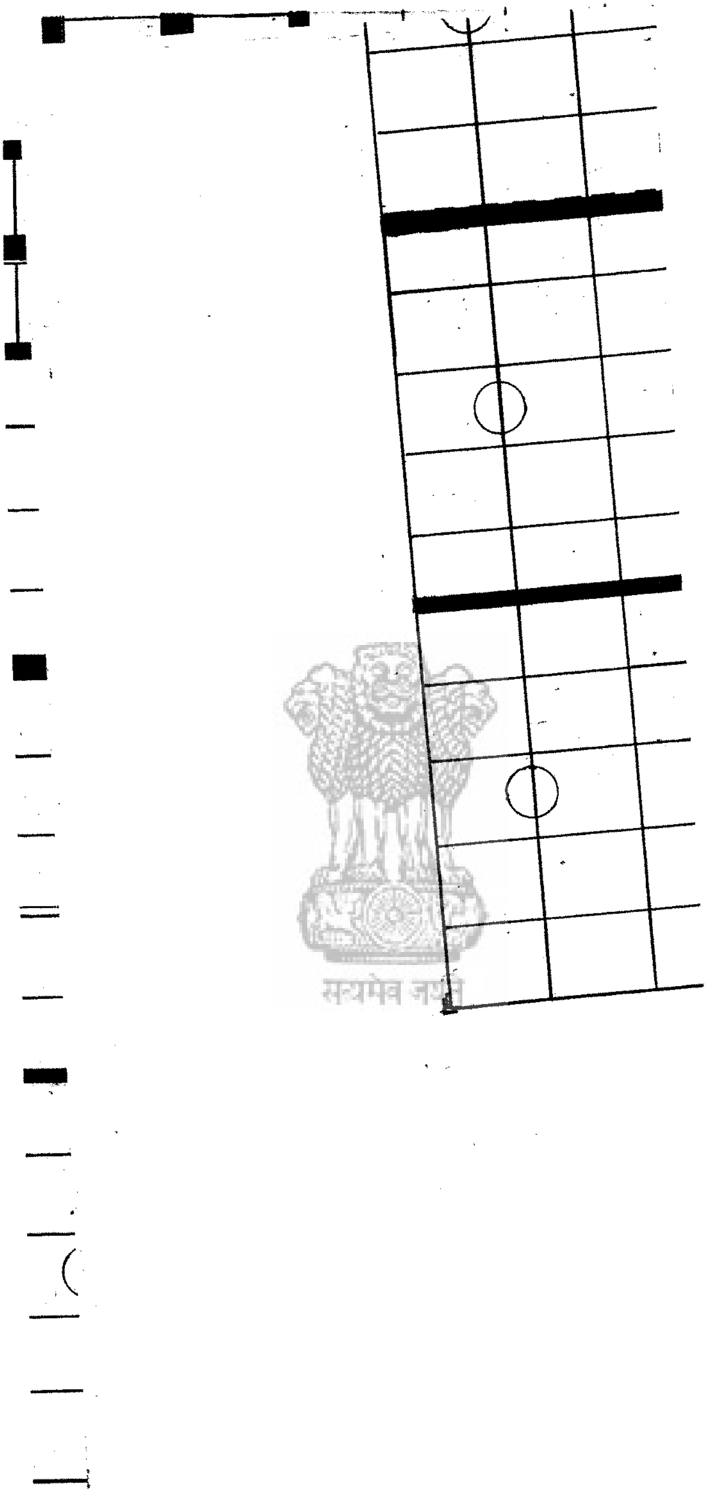
ards. } Total area of the central strip is 200 acres.

r collective form in fields of 40 acres each.



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Statement showing estimated e

1	2	3		4		5		
Serial no.	Items	General Administration		Collective Farms (1,000 Ac.)		State Farm (1,000 Ac.)		Cent
		Non-recurring	Recurring	Non-recurring	Recurring	Non-recurring	Recurring	N recu
		R .	Rs.	Rs.	Rs.	Rs.	Rs .	F
1	Building	35,000	..	88,000	2,640	2,21,000	6,330	10,
2	Staff, Travelling Allowance and Contingencies.	..	40,000	..	16,275	..	21,399	.
3	Initial ploughing ..	..	..	25,000	..	25,000	..	.
4	Layout and fencing ..	..	..	44,000	2,000	44,000	2,000	.
5	Implements	..	..	16,220	1,600	16,220	1,600	.
6	Livestock ..	..	..	96,000	76,800	51,500	28,800	.
7	Cost of production ..	..	..	20,000	51,500	20,000	1,25,750	.
8	Tractor implements ..	..	..	..	..	..	..	.
9	Harvesting ..	..	..	..	..	..	..	.
10	Transport	..	..	..	..	..	..	.
11	Workshop stores ..	..	..	..	..	..	..	.
12	Consumable goods ..	..	..	..	..	..	..	.
13	Depreciation interest ..	..	..	..	..	..	..	.
	Total ..	35,000	40,000	2,89,220	1,50,815	3,77,720	1,85,879	10,

NOTES—Columns 3 to 7 show estimates for units which will not be duplicated in the first 50,000 a
Column 9 shows estimates for three Co-operative Units only of which several are expected to be d

NEXURE I

xpenditure to be incurred by Government

6		7		8		9			10		
ral Seed Store		M. T. S. Centre		Total		Co-operative Farms (3)			Grand Total		
n- rring	Recur-ring	Non-recurring	Recur-ring	Non-recurring	Recur-ring	Non-recurring	Recur-ring	Loans	Non-recurring	Recur-ring	Loans
s. 000	Rs. ..	Rs. 95,000	Rs. ..	Rs. 4,49,000	Rs. 8,970	Rs. 1,53,000	Rs. ..	Rs. ..	Rs. 6,02,000	Rs. 8,970	Rs. ..
.	3,832	..	48,200	..	1,29,706	..	42,725	..	..	1,72,431	..
.	..	..	..	50,000	..	75,000	..	..	1,25,000	..	..
.	..	..	..	88,000	4,000	..	..	1,32,000	88,000	4,000	1,32,000
.	..	..	..	32,440	3,200	..	..	80,400	32,440	3,200	80,400
.	..	..	..	1,47,500	1,05,600	..	..	3,36,000	1,47,500	1,05,600	3,36,000
.	..	..	..	40,000	1,77,250	..	..	4,16,250	40,000	1,77,250	4,16,250
.	..	1,68,900	..	1,68,900	..	..	..	..	1,68,900	..	..
.	..	11,000	..	11,000	..	..	..	..	11,000	..	..
.	..	21,000	..	21,000	..	..	..	..	21,000	..	..
.	..	25,000	..	25,000	..	..	..	..	25,000	..	..
.	..	..	49,000	..	49,000	..	..	..	..	49,000	..
.	..	..	49,000	..	49,000	..	..	..	..	49,000	..
00	3,832	3,20,900	1,46,200	10,32,840	5,26,726	2,28,000	42,725	9,64,650	12,60,840	5,69,451	9,64,650

cres and hence totals given separately.

eveloped in due course.

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